September, 1947 Vol. 36, No. 7

PERIODICAL

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-IAVE-

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

SCHOOL OPENING NUMBER

SO THAT ALL MEN CAN SOAR TO THE ULTRA-STRATOSPHERE

One of the reasons men are firing off out-size skyrockets is they hope to get some light from the sun on the earth's own fuel problems. One of the first ceilings they bumped their heads against was the lack of a rocket body material strong enough to withstand the pressures involved.

As usual, an old and familiar substance solved the problem . . . steel, apparently capable of inexhaustible permutations. A change in its chemistry, a change in its heat treatment, a change in its final handling . . . and resistances up to 200 thousand p.s.i. have been reported.

Mankind hopes that someday mankind as a whole can soar to the ultra-stratosphere in its thinking. And down at the base of the rocket, labor educators who are working at some of the ceilings that limit mankind's flight.

The material educators work with is that old and familiar substance, human clay . . . throughout its bulk and mass capable of infinite permutations, possessing unplumbed possibilities needing only the right chemistry of ideas, the right handling to set it free.

How give the son of Mr. X a sense of the possibilities that *do* lie within him? How get him to pick out a star and—aim his rocket toward it? How enthuse him and funnel his enthusiasm through a single opening? How—if not by delineating the aim of all education in golden and gleaming colors, by tying the work he does in school to the goal with jewel-studded threads of consistency. The conscientious instructor in mechanical drafting will study the profile of daily small events, will never say any is insignificant. Above all he will introduce his subject with respect and will never contradict the impression by saying it does not matter what quality of drafting instruments are used. Man is the only creature that peers between facts and sees significance. The instructor will never overlook the significance of the right start in any subject. He will insist on the best drawing instruments a student can afford.

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Students learn lathe operation faster through the use of South Bend sound films, wall charts, operator's handbooks, bulletins, and projects. Write for Circular 21-F for full information.

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For name and address of distributor nearest you see "Machine Tools" in classified section of phone book.

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All sizes (9" to 16" swings) of South Bend Lathes delivered promptly from distributor's stock or factory.

PRICES

South Bend prices start at $145.00, f.o.b. factory. Average increase less than 15% over prewar price level.

WRITE FOR CATALOG

Request illustrated Catalog No. 100-F.

School years are the formative period which lays the foundation for each student's career. This training must fulfill the future needs of *every* student. Those destined to fill management positions in industry especially require the advantages of practical shop courses. A thorough knowledge of basic processes and methods will help them keep pace with rapidly changing technological sciences and will play an important part in their advancement.

Highly essential in such training is the equipment used. It should be versatile, easy to operate, safe, ruggedly constructed, and accurate. All these features and more are available in South Bend Precision Lathes. That is why they have been selected for use in most of the better school shops in the United States and other countries.

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Building Better Lathes Since 1906

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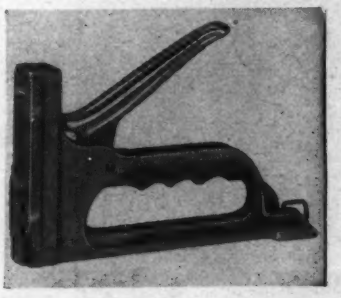
Do your tacking with a STAR Automatic Tacker

Both teachers and students will find dozens of uses for these sturdily built Star machines. Students will turn out neater, better-work — faster tool They will appreciate working with the same fine tools that experienced mechanics are using everywhere.



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TESTED TEACHING TOOLS

More and more school systems throughout the country are adopting *International Textbooks*. Here are three TESTED TEACHING TOOLS that tell you why:

Household Mechanics

•

Woodworking for Everybody

•

Student's Planning Book

348 school systems have adopted this textbook *by Bedell and Gardner*. There are *148 jobs with 642 illustrations* covering woodworking, metalworking, painting and finishing in the home; care of electrical appliances, doors and windows; water supply and waste disposal; and using rope, twine, concrete, mortar and plaster. A complete home workshop section contains data on care and sharpening of tools. *Second Edition, Third Printing*, 256 pages, 8½ x 11, cloth, *$2.40*.

120 school system adoptions is the record of this textbook *by Shea and Wenger*. It is known as the *"best all-around book in the woodworking field,"* with excellent organization and approach. It describes wood and its many uses; explains what hand tools and equipment are needed; gives detailed instruction about the various processes. Use of woodworking machinery, safety first hints and *46 fine projects* are included. *Fifth Printing*, 187 pages, 8½ x 11, 472 illustrations, cloth, *$2.40*.

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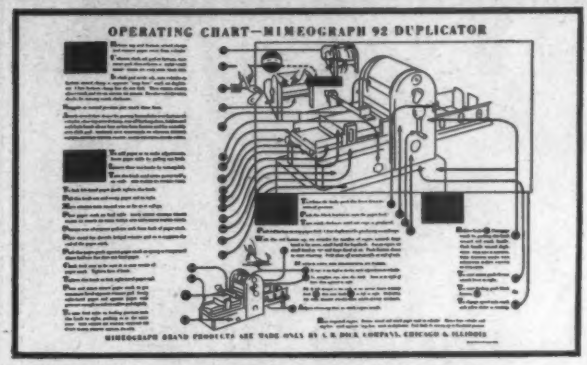

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"Fundamentals of Mimeograph stencil duplication." Prepared by Peter L. Agnew, Ph. D., Professor, School of Education, New York University, and Professor Russell N. Cansler, School of Commerce, Northwestern University, leading authorities in the field of business machine education. An educational tool needed by every commercial department. Price, per copy, **60c**

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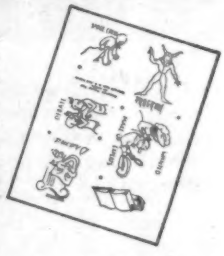

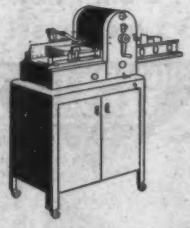

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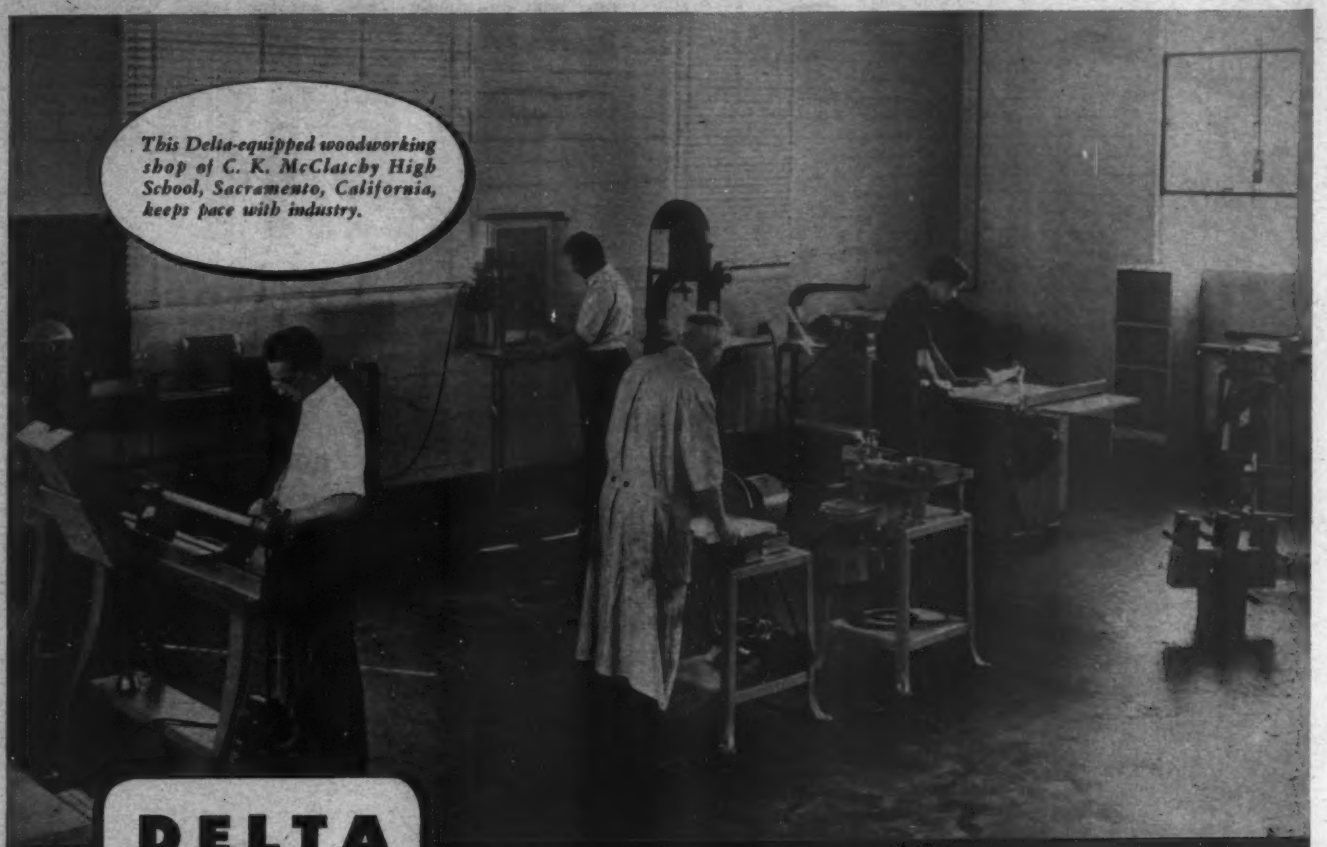

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More shop tools for fewer equipment dollars . . . .

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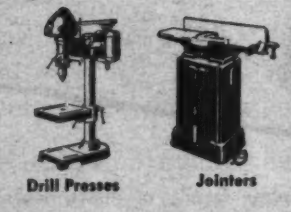
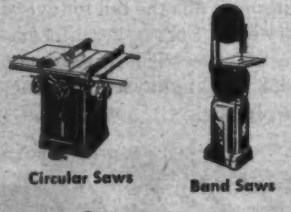
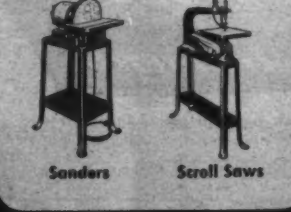


Drill Presses — Jointers



Circular Saws — Band Saws



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Delta provides cost savings on light machine tools for metalworking and woodworking, by applying modern production methods to a large volume of standard models. Quality is not sacrificed; you pay less for the same performance value you get in many heavier, more expensive tools.

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Teach the safe way

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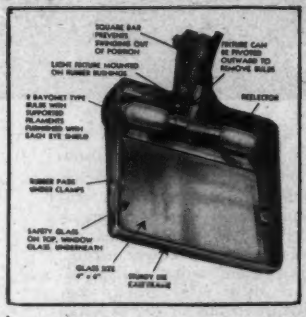
Eye Shields



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ATKINS *Silver Steel* SAWS

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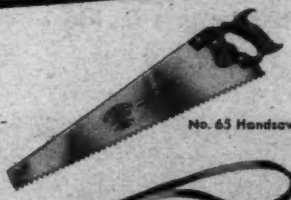
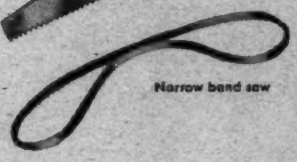


No. 65 Handsaw



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Hacksaw frame and blade

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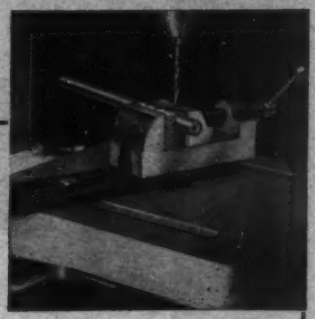

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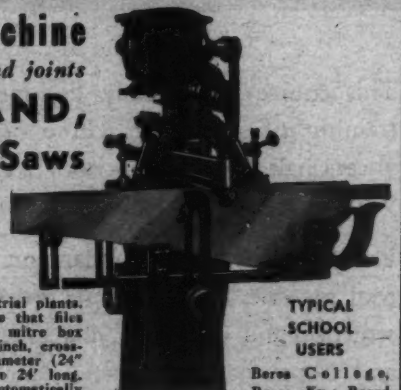

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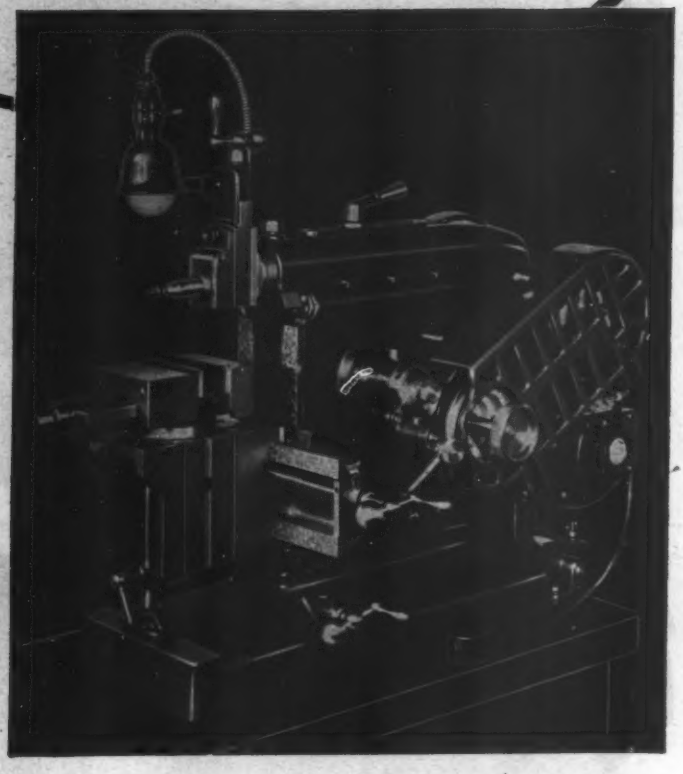
School shops now turn out Amazing Precision Work with AMMCO 7" SHAPER



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Low in price, compact and space-saving in design, there is no big, expensive shaper that can beat AMMCO 7" SHAPER for accuracy and precision.

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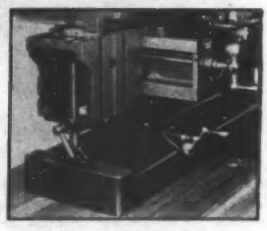
With special safety features, this is the ideal Shaper for school shop use. And at its new low price, it comes within the limits of your school budget. In bench or portable models . . . ready for immediate delivery! Write for specifications and low prices. Address Dept. IA-57.



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(1) ARMSTRONG Carbide TOOL HOLDERS and ARMIDE (Carbide Tipped) Cutters.

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"THE TOOL HOLDER PEOPLE"
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Precision made, finely balanced Lufkin calipers bring skill to student hands. The same fine, durable tools preferred throughout industry by careful mechanics. Teach good workmanship with good tools—specify Lufkin in your requisitions. Write for free catalog.

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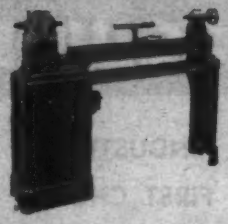
Radial Saw, RA1104. For cutting wood, plastics and non-ferrous metals. Price: Complete, including 1 H.P. 3450 r.p.m. motor, two 10" blades and maple top table; without cast iron floor stand, $375.95.



Variable Speed Lathe, L1152. Price: Including variable speed drive, base 12" and 6" tool rests and 2" or 4" motor pulley. Less motor, $139.50.

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Their production-proved qualities of flexibility, accuracy and dependability put Walker-Turner Light Machine Tools way out front in thousands of industrial plants. These same qualities assure the most practical training possible for today's students.

Light weight and compact, Walker-Turner Machine Tools offer wide flexibility as to location, mounting, speeds and control. They may be set up and operated as bench models or floor models, singly or in groups.

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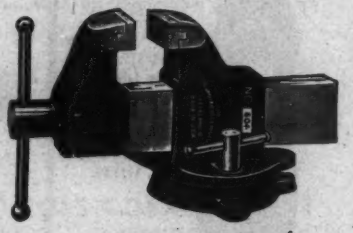

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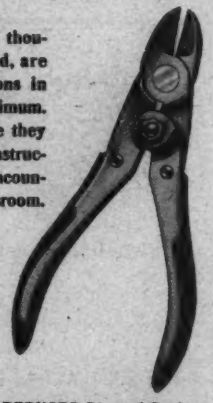

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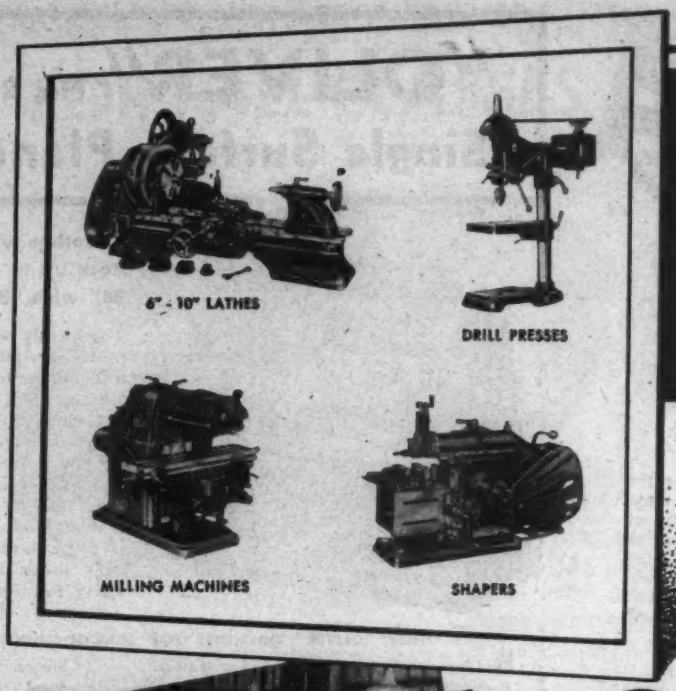

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With Sheldon Shop Benches

More progress has been made in industrial arts during the past ten years than during the entire preceding century. Sheldon shop benches reflect this progress in every detail of appearance, fabrication and utility. Today, there is a Sheldon shop bench for every industrial and vocational purpose. Let Sheldon Engineers help you determine, exactly and economically the type and number of benches — sheet metal, electrical, automotive, wood-working, foundry planning and other "areas" — needed for your particular purpose.

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Smoothly surfaces stock up to 24" wide, 8" thick

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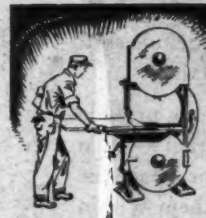

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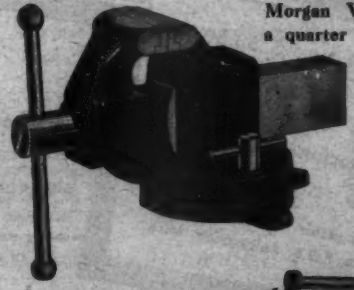
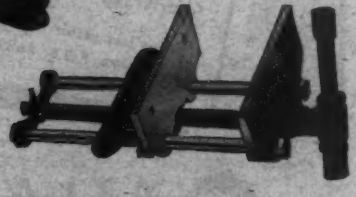


Morgan Vises represent more than a quarter of a century of experience in manufacturing vises. Made of quality materials and exacting workmanship, these vises are ready and able to give the utmost in school shop service.



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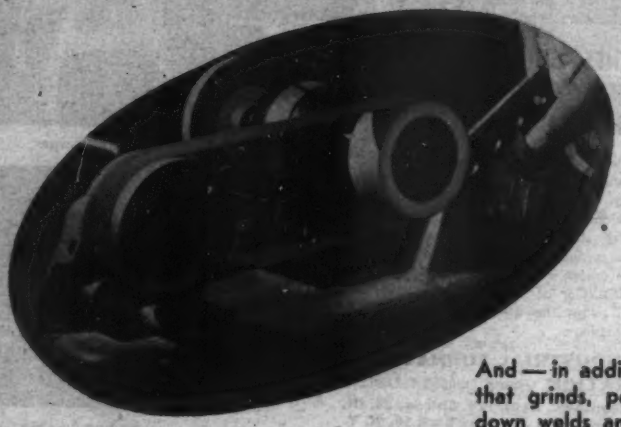
FOR FALL CLASSES . . BENCH BELT-GRINDING IS "*Must*" INSTRUCTION



When industry develops and adopts a revolutionary shortcut method that can be demonstrated to students on existing shop equipment — that method becomes "must" instruction.

A simple, bench-type idler backstand applied to your present bench grinder* converts it to a utility belt-grinder, identical in every respect to the production models which have so widely revolutionized industrial grinding, polishing and finishing methods.

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● AT LEAST ONE COPY of this new booklet should be in every woodworking and manual training classroom. It tells in simple, understandable language the way to use the new Stanley-Carter Dovetail Attachment. It will help you teach your students the modern way of cutting dovetails, easily, quickly and accurately. *Send for a copy today. Fill in and mail the coupon.*

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Please send copy of your instruction booklet on the new Stanley-Carter Dovetail Attachment.

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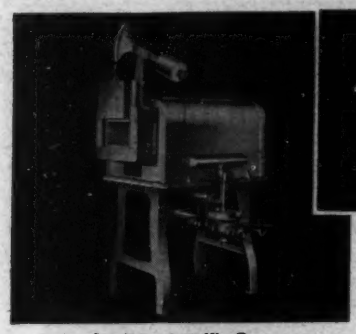

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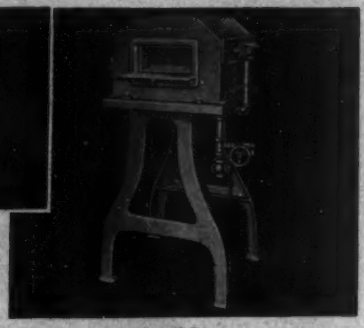

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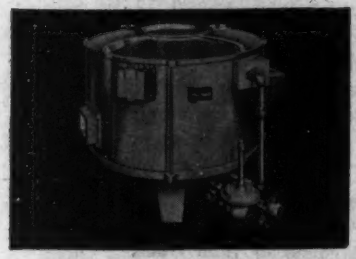
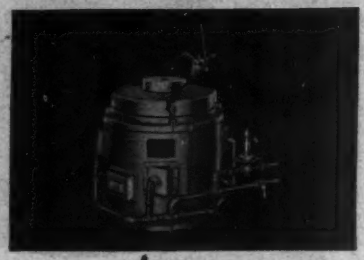


Round Pot Furnace



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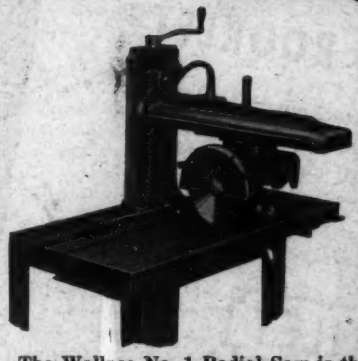

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Column, arm and motor rotate to any angle. Motor moves back and forth in arm for cross-cutting, angle-cutting, and rip settings. Motors to 2 H.P. cutting up to 4" deep.

The Wallace No. 1 Radial Saw is the most versatile woodworking machine made! Does cross-cutting, angle cutting, compound angles, ripping, bevelling, rabetting, shaping, routing and many other jobs.

This is the most practical saw made for teaching carpentry and cabinetmaking — thousands in industrial use.

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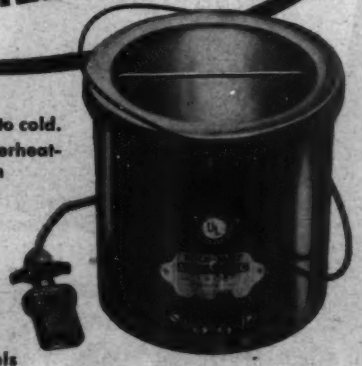
HOLD-HEET ELECTRIC GLUE POTS



- Glue never too hot—never to cold.
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- No water jacket to boil dry.
- Rugged steel body. Guaranteed heating element.
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FOR STUDENT ADVANCEMENT IN SHEET METAL TRAINING

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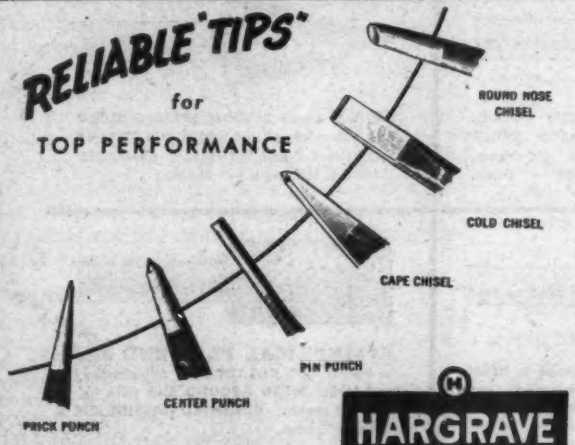

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The heavy duty electric Arc Torch gives a flame of approximately 9000° F. This welder greatly widens the scope of shop work with electricity and metal working. Complete outfit includes Metal Case, Transformer, Arc Torch, two six foot heavy duty cables, Full size approved helmet with Federal Specifications, Glass lens, Electrode Holder, Ground Clamp, Flux, Steel Welding Rod, Bronze Brazing Rod, Aluminum Welding Rod, Two 3-8" Carbons; two ¼" carbons with Adapters and Operating Manual. Operates on 110 or 220 Volts A.C.

Order Direct..... Total Wgt. 50 lbs. $59.50 F.O.B. Chicago.

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PRECISION-MADE
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Correct in shape.
Accurately cut or ground.
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Now available are *types, shapes, sizes and cuts for every purpose:*

HAND CUT ROTARY FILES *for use principally on the ferrous metals and other hard materials.*

HIGH SPEED GROUND BURS *for use principally on the non-ferrous metals and other soft materials. (¼" and ⅛" shanks in both Hand Cut and Grooved types.)*

CEMENTED CARBIDE BURS *for extra efficiency and extra-fast metal removal on the long production runs. (¼" shanks only.)*

Typical shapes—nearly all in assorted head sizes—are shown below. Your industrial distributor can supply you.

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OVAL shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

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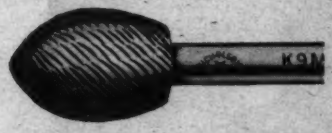
CONE shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

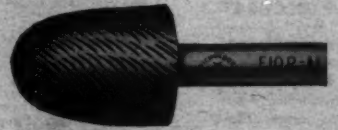


FLAME shape in HAND CUT ROTARY FILE *(Illustrated)* and HIGH SPEED GROUND BUR with ¼" and ⅛" shanks.

INVERTED CONE shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" shank.

CYLINDRICAL FLAT END shape in HAND CUT ROTARY FILE *(Illustrated)* and HIGH SPEED GROUND BUR with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

TREE POINTED END shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.



TREE RADIUS END shape in HAND CUT ROTARY FILE *(Illustrated)*, HIGH SPEED GROUND BUR and CEMENTED CARBIDE BUR with ¼" shank.

CYLINDRICAL RADIUS END shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

NICHOLSON FILES *FOR EVERY PURPOSE* NICHOLSON U.S.A.

▶The New School Year

This issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is offering articles that were chosen with an eye to their helpfulness to the teacher as he enters on the school year 1947–48.

A few of these articles are here mentioned so that the reader may not overlook them in his haste to get at his real work — the opening of his shop for the new school year.

The very first article is on a subject that deserves more consideration than is usually accorded it. "Our Public Relations" by Thomas A. Hippaka deserves careful reading and consideration. The individual teacher may feel that school publicity does not fall within his domain. If the school system, in which a reader functions, has a good publicity program, he should see that he provides the publicity department with good material about his school shop. If there is no such department he should try to inaugurate one.

Albert E. Jochen, in his article, "The Induction of New Teachers," touches upon a subject that never received enough attention. The new teacher will be a better staff member if he is made to feel at home as soon as possible.

J. Douglas Wilson's, "Earmarks of a Good Teacher" offers an opportunity for worth-while self appraisal, and G. Harold Silvius' "The Function of Industrial Education in American Secondary Schools" gives a last-minute resumé of why industrial arts is and should be taught in our school systems.

Einar E. Siro calls attention to something that every teacher, especially the shop teacher, should think about and act upon, and Glenn D. Warrick's "Industrial-Arts Objectives" bears reading and rereading.

The new series titled "Some Leaders in Industrial Education" by William T. Bawden is a must for anyone interested in industrial arts and vocational education.

Besides the foregoing there are other articles written by professional men for professional men. Check them all before laying aside the September, school-opening number of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

▶Important

If the September issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION reaches you at a summer address, and you are going to be located at a new address for the coming year, kindly notify us at once.

It will require but a post card. Be sure to give your old as well as the new address, street number, city, zone number, and state. Your school location is important also.

The main thing is — do it at once!

▶This Month's Cover

The cover picture used for the school-opening number of The INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine shows a student who is about to start the welding unit of the exploratory course at the Highland Park High School, Highland Park, Mich. — Norman Boze, instructor.

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Industrial Arts and Vocational Education

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

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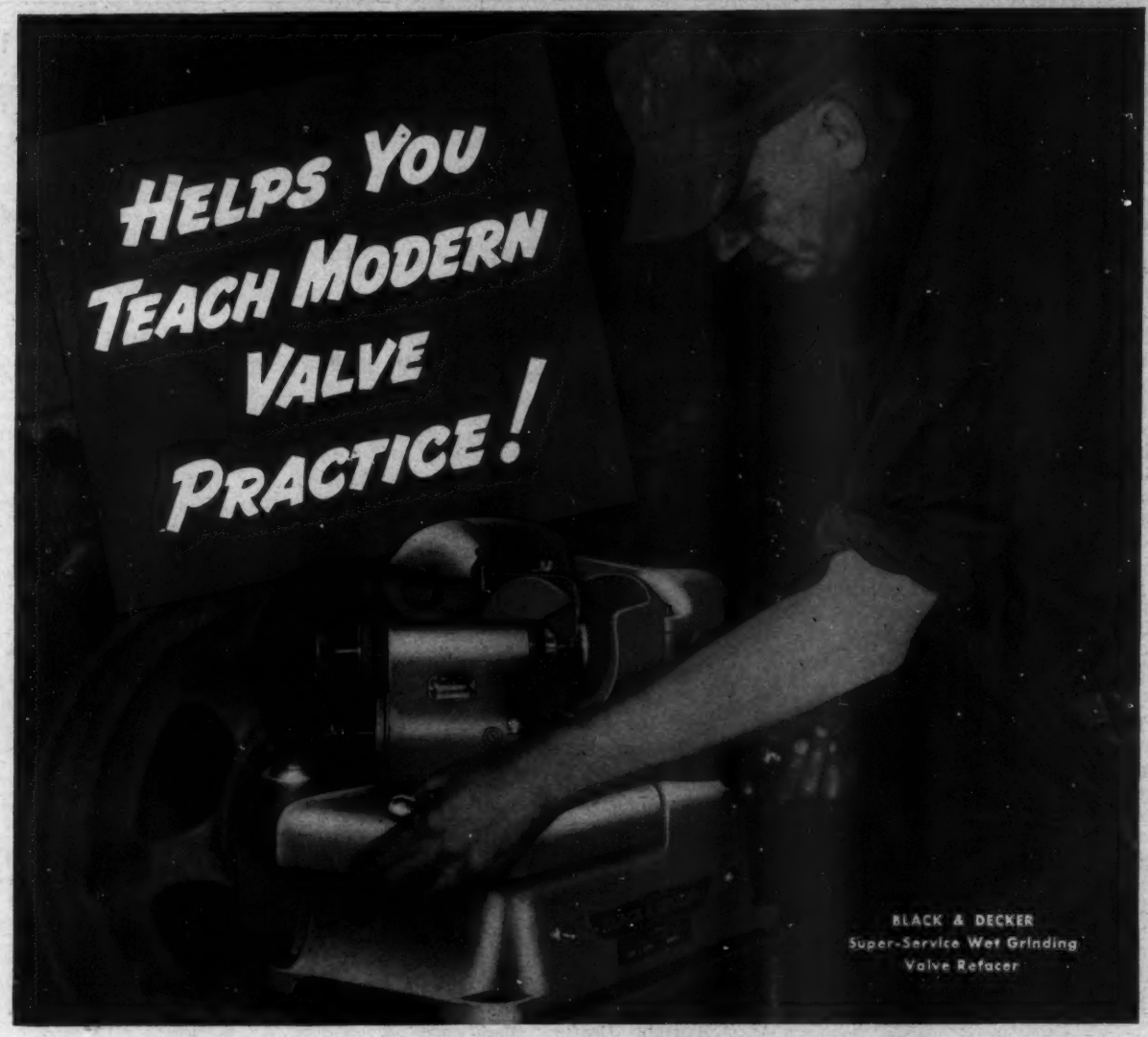

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Our Public Relations

T. A. HIPPAKA
Professor and Head of Industrial Education
Iowa State College
Ames, Iowa

"The objective of all public relations effort is improved understanding, increased appreciation, and the enlargement of the circle of friends who will speak and act for the institution." —*W. Emerson Reck.*

May it be stated at the outset that the building of sound public relations must be characterized by positiveness of approach. Our proposals must always be sound. Recommendations need to be accompanied by sufficient, substantiating evidence at all times. When we cannot substantiate our proposals, retreat from our position becomes a sad reality. Retreat is inevitable when we are not certain of ourselves; when we as a teaching staff lack singleness of purpose; or when we are deliberately or shortsightedly proceeding in a wrong direction. Then, very definitely we are inviting disaster. Understanding and agreement in a sound educational program on the part of the entire staff in any school is imperative to good public relations. Each must sacrifice something; all must make a substantial contribution in order that the purposeful essentials of the program will become possible of attainment. To agree in staff meetings, and to deliberately disagree among ourselves, or to undermine staff policies in public is not good practice. Public confidence, the foundation stone of public relations, is not secured through such shortsighted activities. Staff disagreements, and there will be some, are not to be aired in public. The place where the teacher who is public-relations-minded disagrees, if disagreement there must be, is in the staff meeting, where differences can be and should be amicably ironed out. Educators should make it a rule never to wash their dirty linens in public; for when that is done they start with a decided disadvantage, as far as the ultimate solution of any internal or external problem is concerned.

Public Relations Defined

Our public relations may be defined as the sum total of all the impressions created by the school or the school system. These relationships may be good, mediocre, or poor, depending upon the utterances, writings, actions, and the appearance of those who are in any way connected with the school or the educational system.

Who are these people who have so much to do with the creation of the sum total of impressions made upon the all-important public? They constitute everyone from the custodian to the superintendent. In this all-inclusive category we must include the pupils, who constitute the product of our efforts, and who are generally subjected to the careful scrutiny of the public; as are we who direct their growth. After all, it is the general public that pays for the cost of education, and taxpayers have a right to judge us by our output as well as by our actions. Obviously, wherever adverse opinion is created, whether it be by an office assistant or by the highest administrative official, detrimental repercussions are quite generally in the offing for us.

Gains Derived From Good Public Relations

A variety of very substantial dividends are bound to accrue from improved public relations. What our schools, and industrial education in particular, gain in the way of support from school patrons, depends in a very large measure on our relationships with the public. Workable understanding between school personnel and taxpayers pays off in terms of a better school plant, additional equipment, more supplies, generally improved conditions for pupil and teacher alike, and more adequate salaries for staff members. Needless to say, it is regrettably true that in too many schools throughout the land, inadequacies in these essentials, as well as in many others, are increasing at an alarming rate. Such inadequacies are definitely traceable to deficiencies in our public relations.

One need not be an unreasonable pessimist to conclude that we are failing in our public relations. We certainly have not sold our public on our school programs when the average salary of teachers across the nation has recently been as low as $1,120 a year; when teachers' salaries range from less than $300 a year for negro teachers in Mississippi to that of a telephone operator or a bus driver. Since 1940 the cream of our teaching personnel has left to the tune of 350,000 strong. And the end of the exodus is not yet, although American youth are short 75,000 teachers. Many city supervisors are not being replaced when they leave. About the only machinery secured by many school shops in recent years is of the war surplus variety, too often absolutely useless to anyone. Legislative appropriations have often failed to materialize because of a lack of united action on our part. Needed school plants with adequate shop facilities are not being built. Teacher loads have reached ridiculous proportions, where teachers can neither prepare nor recover adequately for the next day's ordeal.

Not until we resolve to make our chief business the improvement of our public relations will the situation grow any better. It will take greater courage, intelligence, common sense, sacrifice, tact, salesmanship, efficiency, and forthrightness than we are displaying at present if our boys and girls are to have the educational opportunities which they so desperately need. All of these attributes added together constitute a rare mixture, to say the least. Nevertheless, at least our key people in any school system must possess them if American youth are to get a fair deal.

Selling our schools entails the all-important task of educating the public. Educating the public can well mean the modification of our sense of values. And there is much that is wrong with our sense of values. While it is still true that America spends more money on education than any

other nation in the world, comparison of our educational expenditures with expenditures on nonessentials presents quite a different picture. Any nation which spends as much for tobacco and three times as much for liquor as it does for education needs a drastic change in her sense of values. As educators, we need to believe with all our hearts and souls that our work is the most important job in the world, and that the very peace of this world depends upon how well we are able to do our job. Not until we do, will education gain the support which it must have if our civilzation is to survive.

The Student and Our Public Relations

Apparently in our effort to improve our public relations we need to be reminded that schools are built primarily for youth. The needs of youth determine our every action. Consequently, when we purchase books, lumber, hardware, hand tools, machines, and workbenches, they are for our boys and girls. The attitude that most anything is good enough for our young people must not be tolerated. Youth cannot prepare adequately for an atomic world, such as ours, with inferior equipment. Modern equipment will become outmoded soon enough. Such is the stand which we must take firmly, but tactfully, as we refuse to accept second-rate substitutes for our schools. Where pupils are the benefactors, teachers too will profit proportionately, for as the pupil fares, so fares the school personnel. Needless to say, the entire community profits by a sane policy of buying and planning. Constantly, we must champion the cause of youth with a sound program of planning, building, and purchasing, thereby keeping our public relations on a high professional plane.

Usually the people in a community gain their first impressions of us through our pupils. They tell their parents, friends, employers, and townspeople about us. We mean more to youth than we generally realize. Furthermore, there are very few people more important to parents than the teachers of their children. Parents are our best boosters when their offspring succeeds in purposeful school undertakings. Friends of youth become the friends of our schools when our pupils are happy in them. When youth praise their school to their employers and demonstrate to them proficiencies gained in school, employers too become stanch advocates of our program. Townspeople in general will support our schools when they see a well-behaved product of our schools practicing the best in citizenship. Consequently, one of our most immediate and fruitful ventures in public relations is with and through our students. Constantly we need to remember that when our students fail, we as teachers fail with them. Under such circumstances our schools have lost student friends who in turn influence others, beginning with their parents, all of whom will look upon us and our program with disfavor. School support is seldom forthcoming when apprehension and misgivings prevail.

In every possible instance our efforts should be characterized by unified group action. The "let George do it attitude" seldom gets us anywhere. Whether we like it or not, America is a country of pressure groups. As individuals, we accomplish very little single handed. Goals are attained through intelligent, collective action. If we are to attain our objectives, we need to strengthen our professional solidarity through the unified effort of all of us, which means compromise and sacrifice on the part of each and every individual member of the profession. It takes the concerted group action of all staff members in any school or school system to secure the maximum of educational opportunity for our youth. As members of any school staff we should be keenly aware of the fact that we constantly represent our group. Even in casual conversation with townspeople, we should promote our group policies. Under no circumstances should we become self-appointed ambassadors of ill will, confusion, and doubt. Whenever group policies are being formulated, it is our responsibility to participate to the best of our ability and to the maximum of personal satisfaction in their establishment in order that such policies may be ours to uphold and to sell.

We deliberately invite trouble when we are too far behind or too far ahead of our public in school policy. Dissatisfaction soon spreads, especially in a progressive community which discovers that aims, method, and accomplishments constantly lag in its schools. And surely, for this there can be no justification. Going to the other extreme, we can get ourselves into difficulty by being too far ahead of the community. School patrons will not willingly move any faster than they are educated to move, and it is our business to educate people to a program so that they will really want it. In doing so, it is always necessary for us to remember that all that is old is not bad, and all that is new is not good. Yes, it is imperative that we not only influence public opinion, but accurately gauge it in order that our schools may go forward with voluntary public support coming from voters, because they want what we have to offer.

The Staff and Our Public Relations

Good public relations have their real beginnings in the school staff. A public-relations conscious faculty sees to it that their own house is always in order. Mutual understanding and confidence among members of the staff begets the understanding and confidence of the public, without which schools cannot render a maximum of service. Let us examine briefly some of the relationships which staff members can well enjoy with each other, and thereby enhance their position in the community.

Teacher-teacher relationships should be exemplary in character. Pride should certainly be a silent partner in this all-important undertaking. Since we as teachers are charged with the grave responsibility of teaching others to live and to work together as becomes citizens in a democracy, we can best do so by setting an appropriate example through our conduct toward each other. Pupils should never have any reason to feel that their instructors are at odds with one another. Added insecurity is the price which students pay under such circumstances. Differences among staff members are bound to arise. However, such differences should not be exhibited unduly before students. Instead, differences should be ironed out in private conference. Better yet, where there is previous understanding and common agreement as to objectives, teaching methods, and the use of supplies and equipment, disquieting incidents between personnel will seldom arise in the presence of students.

We need to respect each other's rights at all times. There must be an appreciation of the other fellow's problems accompanied by reasonable understanding of him and his work. Courtesy, co-operation, and good fellowship should constantly prevail as we deal with one another, and as pupils observe us in our joint efforts in their behalf. Workmanlike methods accompanied by good sportsmanship must characterize our dealings with each other as we share plant and equipment facilities in the attainment of commonly accepted educational goals.

Administrators and Staff Co-operation

Administrators need to seek continuous staff participation in all types of educational planning. Whether it be curriculum construction, a new salary schedule, a teacher-rating scale, the designing of a school plant, or a guidance plan, staff participation should be sought by the administration. Some there are who insist that such a procedure is too time consuming. The fact of the matter is that in the final analysis, time is actually saved. Through participation, any program or plan belongs to all those who have had a part in its formulation. Upon its completion it is theirs; they are generally ready and more willing to sell it to the waiting public. They are its ad-

vocates and not its destroyers. Staff members rightfully feel that the program or plan is theirs, for it is of their making, and not something that has been foisted upon them. After all, administrators should realize that any plan must be sold to the staff, and that it is best sold to the school personnel through their having aided in formulating it. Participation by school personnel spells ownership, and ownership is not apt to breed serious discontent with school policies thus formed.

The line and staff type of organization should prevail particularly in the large city system. In order that satisfactory human relationships may be maintained in the staff, such a system of organization needs to be clearly understood by all. The necessity of such organization should be obvious to staff members, and that it recognizes two types of workers, line officers as well as staff officers.

Who constitute the line officers? They are the superintendent, assistant superintendent, principals, assistant principals, and department heads.

Line officers are generally executives with considerable power. Authority flows from the superintendent to the teacher through the assistant superintendent, principal, assistant principal, and the department head. In the small school, each teacher is directly responsible to the principal who has to be a versatile individual.

Staff officers are the technical experts in the superintendent's official family who have charge of subject or service departments.

Subject supervisors direct the work in such fields as homemaking, health, and physical education, industrial education, art, and music. Their primary function is to improve instruction in their respective fields. They work through the principal keeping him informed of their plans, methods, and progress at all times. Co-operation is an imperative between principal and supervisor if there is to be the proper meeting of minds between teacher and pupil.

Staff officers in charge of service departments play an important role in any school system. These supervisors are the experts in such essential areas as statistics and records, purchases, personnel, buildings and grounds, curriculum, and evaluation. To whom are these officers responsible? Even today, this question arouses controversy in too many school systems. Where line and staff organization agreement has not been reached, there is apt to be confusion, inefficiency, and hard feeling between personnel. Naturally it needs to be emphasized that service department supervisors are definitely responsible to the superintendent for all activity in their respective fields.

The technical library in the shop

What should be our attitude toward the flow of power in the line and staff type of organization? Tempting as it may be at times, by-passing around an immediate superior is not conducive to good staff relationships. We need to refrain from doing so not because we fear authority or because we worship power, but because we respect an individual for the responsibility which he has assumed. Good working relationships are always founded upon mutual respect and trust.

Proper Attitudes Toward Others

To get along with people is an art. Our attitudes toward others, our methods in dealing with people, and even our philosophy of life have much to do in determining our human relations. The following axioms are presented with the hope that they may prove helpful to the busy reader:

1. We need to make up our minds to get along with people.
2. Getting along with people should be a game worthy of our best effort.
3. It is well to remember that the courtesy of patience tends to mark one as a superior person.
4. We will better understand the other fellow when we have learned to put ourselves in his place.
5. To become a "yes man" is a weakness.
6. It is good business to respect the other man's opinions at all times.
7. Criticism should be constructive.
8. One's temper needs to be under control at all times.
9. Jealousies stamp us as small men.
10. Belittling anyone is damaging to all concerned.
11. Good public relation mean we have time for everyone.
12. Building up the other fellow's importance constitutes good technique.
13. Friendships are to be cultivated at all times, for friendliness tends to overcome opposition.
14. Prudence tells us never to air difficulties in public.
15. Jingling praise pays high dividends.
16. Ability is best mobilized by finding good in others.
17. A display of enthusiasm on our part arouses it in others.
18. Questions which reflect understanding tend to win co-operation.
19. We need to be good listeners.
20. By expecting good of others, we bring out the best in people.
21. It is good practice to take it for granted that we will like everyone.
22. To live by and apply the Golden Rule still constitutes the very best in procedure.

23. To have acquired the reputation of a "doubting Tommy" is most undesirable.

24. Asking a favor of a sulky individual often touches a responsive chord.

25. It is imperative to guard against becoming an "alibi ike."

26. Promptness marks one as a man of his word.

27. Appropriate and timely questions alleviate tensions with those who have grievances.

28. Believing that the majority of people want to do what is right brings out the best in them.

29. Keeping in mind that people respond best to a square deal constitutes good logic.

30. Each person whom we meet can well be an interesting, yes, a fascinating, study.

31. We need to take people in an impersonal-personal way.

32. It is imperative to be shock-proof, for human beings do get into all kinds of difficulties.

33. At least in the beginning of our relationships with people, it is most necessary for us to take them as they are, and not as we think they should be.

34. If we are to have a positive influence on others we need to have self-confidence as well as ability.

35. In order to reach the minds of others, it is necessary for us to adhere tactfully to directness of approach.

36. It is very poor policy to pry into the personal affairs of people.

37. When raising questions we should not appear to cross-examine the one being questioned.

38. We need to be sincere, for sincerity is a great constructive force.

39. A good beginning is generally made by placing premium on the good qualities of others.

40. We need to have faith in our fellow men.

41. To leave others thinking well of themselves, because of honest encouragement, is heartening.

42. The real leader receives credit by giving it to others.

43. It is easier to censure; the strong way is to overlook, construct, and praise.

44. The real leader says, "Let's go."

45. When we ask a man for an opinion we raise his self-confidence.

46. To build good will wherever we are, should be our constant goal.

47. Tact is an asset worthy of our most careful cultivation.

48. "Service above self" is the acme of motives.

49. High ethical standards in one's profession brings excellent returns.

50. Magnanimity is still a good weapon to employ with unreasonable people.

51. We allow others to "blow off steam" so that we can reason with them.

52. A sense of humor saves many a grave situation.

53. To know public opinion is a first requisite with those who would succeed with the public.

54. Our vocational competency is never to be discounted as a positive factor in public relations.

55. We must have sufficient moral courage to state our views frankly, accompanied by sufficient judgment and loyalty not to express our views to the point of being troublesome.

56. Fear should never be allowed to dominate as we deal with the public.

57. Character is the foundation stone upon which lasting human relationships are built. Men of character trust each other, and leadership with character is seldom molested.

58. We will be misunderstood at times in spite of our every precaution. Misunderstandings need to be remedied immediately upon their discovery.

59. Those of us who work with the public need to be sufficiently realistic to recognize that at times there exists deceit and even intrigue among men, and the best defense is a timely offense founded upon best practices and high personal integrity.

60. In spite of our very best foresight, planning, and execution, we are bound to commit some errors which will cause embarrassment. The consequences need to be taken sanely, and further mistakes reduced to a minimum.

61. Knowingly or unknowingly we should never develop a reputation for rendering snap judgments.

62. Warranted criticism needs to be taken wholesomely to heart; unwarranted criticism needs to be met, man to man.

63. Sacrificing reasonable personal advantages for the good of the group constitutes the best in the promotion of human relationships.

64. We need to be practical in dealing with those who are hard-boiled, unreasonable, crafty, and deceitful. However, let us not become so calloused that we cannot be human to those whose motives are beyond approach.

65. We need to remember that all taxpayers are our employers.

66. The children of all the people, from "both sides of the track," rich or poor, good or bad, offspring of laborer and entrepreneur alike come to us for guidance, and regardless of status they have a right to expect fair treatment.

67. We need to avoid cliques.

68. Administrators particularly should never surround themselves with a few favorites.

69. While we are judged by most everything that we do in the community, and properly so, we still have a right to do all that becomes any decent citizen in a free America.

70. It is not enough to know public opinion, important as that is; we must steer it in the proper direction.

71. We must believe that even constructive personal opinion is worth little until it becomes public opinion.

72. The best approach is to strive for something purposeful and sound, always planning and working in terms of pupil needs, and not against somebody or something.

73. As molders of public opinion, it is essential for us to believe that public opinion is the greatest force in America and in the world.

74. Contrary to many, any community looks to its educators for leadership. We are marked people, and our chief responsibility can well be that our thinking is sound at all times.

75. Only weak leaders are afraid to develop those under them for fear that they will surpass them. Strong leaders know that they enhance their own strengths when they strengthen their associates.

Since our public relations depend largely upon our ability to deal amicably with people of all ages, and in all walks of life, we had better make people our first concern. Although teachers are usually judged first by their performance in their shops, laboratories, and classrooms, there is no escaping association with people in the community. Therefore, it is of utmost importance to make a study of all men so that in the performance of everyday duties we may deal with them intelligently. La Rochefoucauld counseled us well when he said:

"It is more important to study men than books."

The disputes that yet separate nations can hinder, but they must not prohibit attainment of the common goal of all peoples. If there is room in our own country for every shade of political and social and religious thinking and expression, there is room in the world for different philosophies of government, so long as none is dedicated to the forceful imposition of its political creed on others. — *Dwight D. Eisenhower.*

An hour's industry will do more to produce cheerfulness, suppress evil humors and retrieve your affairs than a month's moaning. — *Benjamin Franklin.*

The Function of Industrial Education In American Secondary Schools

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It is generally recognized that secondary schools are responsible for providing an educational program for all youth from 14 through 17 years of age. We now have seven tenths of the youth of secondary school age enrolled in secondary schools. There has been a continual increase in the percentage of attendance since the turn of this century when only one tenth of the population in this age bracket were in secondary schools.

Figure 1 shows the rapid growth of the secondary schools from 1890 through

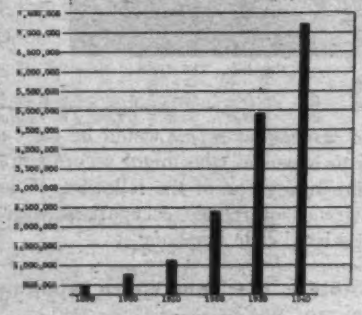

Fig. 1. Increase in full-time secondary school enrollment from 1890 to 1940

1940.[1] It is based on the population from fourteen through seventeen who were attending a day school on a full-time basis, but does not include those who were attending night schools or part-time programs that are maintained in vocational education.

Because of this continued increase in secondary school enrollment for five decades, there is every reason to believe that it will continue to increase until it reaches a point where nearly all youth from 14 through 17 years of age will be in school.

Recognizing these conditions, The Educational Policies Commission in 1944, released a publication with recommendations for making the American secondary schools functional enough to meet the needs, interests, and the aptitudes of all youth. Their publication contains many suggestions of interest and importance to education leaders.[2]

In light of the trend to reorganize our high schools on a functional basis for all, it suggests that industrial education programs in public secondary schools be evaluated in terms of their contribution to aims of secondary education and educational leaders recognize their responsibility of providing a program of industrial education that is extensive enough to meet the needs, interests, and aptitudes of all youth in this age group.

Industrial Education — How Organized

Industrial education has been organized largely as either vocational-industrial education or as industrial arts. A few large cities, however, have technical high schools. Brooklyn Technical High School in New York, and Cass Technical High School in Detroit are typical examples. It has been stated that the purpose of these technical schools is: "To prepare students for positions of leadership in industry that require considerable technical knowledge, though less than that required of engineers, and some mechanical training and skill though not as much as is secured by skilled craftsmen during a four-year apprenticeship."[3] The day school programs in most technical high schools provide training for college, especially engineering, as well as industrial employment. All have extensive evening programs for adults, for training or upgrading technicians for occupations in which engineering training is not required.

In addition to the public schools, there are private trade schools operated for profit, private trade schools of a philanthropic character, semiprivate trade schools, corporation schools, and trade schools maintained by correctional and penal institutions which provide facilities and training programs for youth in industrial education.[4]

Objectives of Vocational — Industrial Education

Objectives of vocational-industrial education are: first, to teach a trade or industrial pursuit to those interested in preparing to enter a skilled occupation; second, to improve the skill and knowledge of those who are already employed in skilled occupations. Since the enactment of the Smith-Hughes Act in 1917 all states have maintained programs of vocational-industrial education.

In 1940, when the youth who were enrolled in night schools and part-time programs were counted with those in full-time attendance, it was found that 70.3 per cent or 8,648,976 persons from 14 through 17 years of age were participating in our educational program.[5] In 1944, vocational training was provided for 1.1 million youth over 14 years of age who had legally left a full-time school, had entered employment, and were enrolled in a school for part-time work. This included apprenticeship and part-time co-operative, trade extension, and general continuation programs.[6] It is especially significant that there are over one million youth of secondary school age in part-time school vocational classes, since they are not counted with the 31 per cent not in full-time attendance. Approximately a half-million youth were in vocational-industrial education; the others were in agriculture, the distributive occupations, and the work in home economics which is also encouraged and subsidized by the vocational acts.

It has been estimated that 10.9 per cent of the students attending secondary schools, on a full-time basis, are in nonpublic institutions.[7] The Office of Education states that there are 7,200,000 youth enrolled in secondary education, which would leave approximately 6,400,000 in public schools.[8] There were only 170,386 students enrolled in the all-day public vocational schools in trade and industrial classes for the year

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[1] *Schools and the 1940 Census*, Research Bulletin No. 5, Vol. XIX, National Education Association, 1201 Sixteenth Street, N.W., Washington (6), D. C., Nov. 1941.

[2] Stoddard, Alexander J., and others, *Education for All American Youth*, The Educational Policies Commission, National Educational Association, 1201 Sixteenth Street, N.W., Washington (6), D. C., 1944.

[3] Struck, F. Theodore, *Foundations of Industrial Education* (New York: John Wiley and Sons, 1930), pp. 336–337.

[4] *Ibid.*, p. 352.

[5] *Vocational Education in the Years Ahead*, Vocational Division Bulletin No. 234, Washington, D. C., Federal Security Agency, U. S. Office of Education, 1945.

[6] *Digests of Annual Reports of State Boards for Vocational Education*, Fiscal year ending June 30, 1944, Washington, D. C., Federal Security Agency, Vocational Division, U. S. Office of Education, p. 2.

[7] Moehlman, Arthur, *School Administration* (Boston: Houghton Mifflin Co., 1940).

[8] *Vocational Technical Training*, Vocational Division Bulletin No. 228, Washington, D. C., Federal Security Agency, U. S. Office of Education, 1944, p. 11.

— Courtesy, The Detroit News

Every boy is interested in aeronautics

ending July, 1944. This would be .54 per cent of 3,200,000 males in full-time attendance from 14 through 17 years of age. There is a dire need to expand vocational education on the secondary level, if it is to contribute in a major way, to the comprehensive secondary educational program being established to meet the needs of all youth in this age bracket.

Occupations and Job Families

There is a trend to justify industrial education as it contributes to occupational training. The objective of vocational-industrial education seems narrow if we are preparing youth for only one specific trade, when there are 21,653 separate jobs or occupations identified in the *Dictionary of Occupational Titles*. In this classification these occupations are broken down into seven major groups:[9]

Occupations	
Professional and managerial	1,611
Clerical and sales occupations	1,331
Service occupations	567
Agriculture, fishing, forestry, and kindred occupations	310
Skilled occupations	3,528
Semiskilled occupations	7,423
Unskilled occupations	6,883
Total	21,653

[9]Shartle, Carroll L., *Occupational Information* (New York: Prentice-Hall, Inc., 1946), p. 114.

We did not have 75 per cent of these occupations when the Smith-Hughes Act was passed 29 years ago providing for specific training in one of the skilled trades. Today, with more than 11,000 different occupations listed in the skilled and semiskilled occupations, it seems reasonable that we should broaden the objective of vocational industrial education and prepare youth for "occupational families." Shartle describes "occupational families" as groups of related occupations with common factors or characteristics.[10] The War Manpower Commission has provided a criteria by which jobs may be compared to determine if they should be placed in "job families": (1) nature of work done; (2) tools, machines, and other aids used to do the work, (3) materials worked upon; (4) traits required of the workers; (5) knowledge required; and (6) experience.[11]

For example, a course in *clock, watch, and instrument repair* would be most useful to a person who might secure employment in any one of the following 48 jobs:

Groups of related occupations with occupational code numbers:

TABLE 1. Clock and Watch Repairman

4–71.510	Watchmaker
	Clockmaker
	Time clock repairman 1

TABLE 2. Skilled Occupations in Clock and Watch Manufacture

4–72.011	Fox-lathe operator
4–72.012	Underturner
4–72.013	Wheel cutter
4–72.014	Damascener
4–72.111	Caser III
4–72.112	Trainer II
4–72.211	Finisher
4–72.212	Timer I
4–72.217	Balance truer
4–72.218	Final Inspector IX
4–78.676	Inspector

In recent years there has been an extensive development of industrial arts on the high school level. The Detroit comprehensive high schools, exclusive of technical and vocational schools, serve as a typical example. In 1930 there were 45 different

[10]*Ibid.*, pp. 161–162.

[11]Toops, H. A., "Some Concepts of Job Families and Their Importance in Placement," *Educational and Psychological Measurements*, Vol. 5 (No. 3, 1945), pp. 195–216.

Small Mechanical Devices

TABLE 3. Mechanics and Repairmen,

A. Involving Use of a Lathe	
4–75.130	Instrument maker
4–93.771	Assembler
5–13.352	Brass-band-instrument maker
5–83.542	Gunsmith
5–83.901	Machinist, camera
5–83.971	Instrument repairman I
5–83.972	Instrument man IV
B. Not Involving Use of a Lathe	
4–52.481	Ordnance man I
4–93.371	Lock assembler III
5–53.270	Telegraphic-typewriter repairman
5–83.111	Office machine serviceman
5–83.126	Statistical machine serviceman
5–83.121	Accounting machine serviceman
5–83.122	Adding machine serviceman
5–83.123	Calculating machine serviceman
5–83.124	Cash register serviceman
5–83.125	Duplicating serviceman
5–83.127	Typewriter serviceman
5–83.461	Gas meter repairman
5–83.465	Meter repairman
5–83.471	Water meter repairman
5–83.541	Armorer
5–83.551	Locksmith I
5–83.901	Camera repairman I
5–83.973	Instrument inspector I
6–78.634	Electrical assembler II
6–94.411	Assembler
6–94.656	Spray gun assembler
6–98.710	Assembly adjuster
7–09.327	Projector assembler
7–09.328	Camera assembler
7–81.610	Carburetor man II
7–81.910	Speedometer repairman

shops and drafting rooms in these high schools; this was increased to 67 different rooms for industrial-arts work by 1940, an expansion of 67 per cent in facilities from 1930 to 1940. At the present time, plans have been approved for increasing facilities for industrial arts by constructing an additional industrial-arts unit with four shops and two drafting rooms at four of the comprehensive high schools.

Industrial-arts work on the high school level provides an opportunity for students to secure experiences in such typical subjects as metal fitting, machine shop, electricity, woodworking, and drafting. It makes a major contribution to the general education of youth by providing experiences that help people live and work in an industrial society. Specific aims advanced for this work are:

1. To develop a degree of skill in the more common hand and machine tool operations;
2. To provide experiences in several of the common manipulative avocational areas;
3. To provide an opportunity for youth to determine if they have the interests, aptitudes, and capacity to pursue industrial occupations;
4. To develop an appreciation for good workmanship, design, good construction, and the technical information related to the work;
5. To develop wholesome attitudes toward safety, planning, co-operation, and responsibility;
6. To provide an interesting and effective learning situation for youth that may be adapted to their individual differences and needs.

Industrial arts based on these six aims will:

1. serve the needs,
2. meet the interests, and
3. provide activity based on aptitudes,

for *all* youth in the secondary age group, who are not enrolled in vocational industrial education.

Earmarks of a Good Teacher

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How does an instructor know whether he is doing a good job? How does a supervisor check on a teacher's strong and weak points in order to give help when needed? What kind of a checkup can be made when the program is large and only a limited period of time is permitted to be spent with each individual instructor? Are there definite factors that can be seen and noted as a supervisor makes his trips through a shop or classroom, spending a little time watching an instructor put over a lesson?

These questions had to be answered in two programs with which I have recently been associated:

From June, 1940, until July, 1945, as supervisor of the War Production Training program for the Los Angeles city schools, when our supervision office had the responsibility of selecting, employing (through recommendations to the board of education), and supervising some 890 new instructors, most of whom had never taught.

From August, 1945, to February, 1946, as chief of the carpentry section of the Warton American Technical School, Warton, England (a United States Army trade school) when 29 instructors were used in this section within the space of six months, most of whom had had no prior teaching experience.

The same questions *again* need to be answered in connection with the rapidly growing apprenticeship training programs, the large majority of which are conducted in evening schools. What are the answers? An illustration will help clarify the problem.

"How can one tell whether a house has been constructed up to standard and whether the craftsmanship is of a high quality?"

This question frequently has to be answered by merely making a brief inspection. A house is for sale. Should it be purchased?

A little study shows that it is not difficult to find a number of items that can be *seen*, and which tell the story of either good or poor construction or workmanship. Such items as the clean-out for the fireplace; plumbing clean-outs which were easily accessible; which way does the water run on the sink drainboard (sinks have been constructed where the water ran away from the sink instead of into it!); the fitting of doors and windows; do they stick, are the cracks parallel; how large are they, do the doors stay *put* when partially opened (a door that doesn't indicates that the wall is not plumb); all of these items may be quickly noted, checked, and evaluated. A look under the floor shows whether the water is getting in; if it does then the foundation has not been dug deep enough. What about the light switches, are they easily accessible? (Switches have been known to be behind the door; try to find such a switch in the

dark!) How about the drawers — do they operate smoothly; take a look at the glass, has the painter covered it with paint?

This illustration indicates that houses can be measured by inspection. Can an instructor's teaching ability be measured in the same way? The answer may safely be given as "yes," and it may be done as follows. It should be made clear to the teachers that the checkup by the supervisor is intended to help the instructor and not be a criticism of his work. The weak points can be strengthened if they are pointed out to the instructor.

The Classroom Atmosphere

How is the air; is it fresh? Teachers get so interested in instructing they sometimes forget about the ventilation. And the light? Here, too often, nothing can be done; the fixtures may be old, the wattage up to full capacity. However, requests can be made to improve the situation. They will not correct themselves.

What about the students? Are they busy, and what are they doing? A quick walk around the room will tell volumes. What is the quality of their work, how *much* student work is in evidence — even if the course is largely of the lecture, there should be some evidence of student participation, if it is no more than the presence of their notebooks. What do these notebooks look like? Are they organized or merely filled in from class session to class session? And, of course, the equipment can be noted. Here again the instructor too often cannot help this situation if he is short on equipment. Of course, he can continue making requests for more equipment. The requests in themselves show that the teacher is alert to this problem.

Does the Instructor Start on Time?

One look at the clock will let the supervisor know the answer to this one. And what about quitting time too? All closed up and students gone before the alloted time? The time factor certainly does measure the teacher in more ways than one. Late starting and early stopping give evidence of lack of interest.

And Now a Look at the Roll Book

How many on the roll? How many attending? The ratio between the two will tell some kind of a story. It is generally recognized that an enrollment (in evening schools) should be at least 25 per cent greater than the capacity of the class; dropouts and normal absenteeism will pull the group down. However, if the attendance falls much below the 25 per cent, then what is the cause? It may have nothing to do with the teacher's ability or program. However it should be checked and the cause found.

Safety Practices — Are They Followed?

This item pertains primarily to shops with power machinery or cutting hand tools. One walk around the shop and any evidence of loose clothing, lack of machine guards, or improper handling of hand tools can be observed.

Visual Aids

How much they help the teacher who appreciates them. Can any be seen? — models, charts, pamphlets. Are motion pictures used? This last may require a question to ascertain the fact.

A Word About the Instructor

What about his voice? Can it be heard in the back of the room? Is it enthusiastic or otherwise; does he put snap into it?

The instructor's background should not need checking; this should have been done before he was selected and elected; it must therefore be assumed, until proved otherwise, that he *knows his stuff* and is a master craftsman of his trade or subject.

Training Program

Is there one? Just what is this? And is it in sight for all students to read and ponder over? How can one make a journey into a strange land without a map? How can an apprentice make a training journey into the land of *journeymanship* without a map? And that is just what a training program is — an organized list of items or jobs to be learned, done, or mastered because of which the apprentice *grows* in his trade knowledge and ability.

This device helps keep the instructor on the track (to change the metaphor from maps to tracks); to know what is coming next; to know what has gone before.

A Progress Chart

Really a part of the training program setup. A device to record what the students have done; this helps them tremendously as they see evidences of progression and likewise a *light* for the way ahead. Takes time to make and keep? Yes it does but the time saved because of its use can be utilized in keeping track of the individual's training progress.

Teaching Techniques

How can they be measured? Again not difficult to find evidence. The instructor either knows or doesn't know what they are.

What about the students' participation? Do one or two monopolize the class time? Are the students listening as a discussion takes place?

The use of the blackboard can be easily checked. Does the instructor *talk to his blackboard* and then wonder why the trainees never saw or heard?

Can all the trainees see the blackboard? An instructor should occasionally check by going to the back of the room to see if he can read what has been written. Writing should always be quite large for the *long distant* student.

What about the demonstration? Can everyone see it? Sometimes in the very earnestness of the teacher getting a point over through the giving of a demonstration he loses sight of the fact that some of his students are behind his back carrying on a demonstration or conversation of their own.

The *conference method of teaching* is today recognized as one of the best techniques to use. *Pulling out* from a group is more effective than *pouring on*. It is surprising how many times, even in a group that are new to the subject, how much information they have, *collectively*. The conference method merely pools the knowledge of *all* the students; the trick, from the teacher's viewpoint, is to analyze or sort the information — pigeonhole it, so to speak — and then rearrange it into some logical order or topic.[1]

Questioning

How hard it is to ask a good question, or is it? Suffice it to say that no question should ever be asked that can be answered by a Yes or No. Such an answer does not reveal the student's knowledge but merely that he does or does not know that bit of information. To illustrate: "Can you put your left hand in your right-hand pocket?" has only one answer. After the student tells you No, then what?

The famous question: "Have you stopped beating your wife" has implications that are not nice to consider — a Yes or No answer is disastrous in its meaning.

There are questions that may appear at first glance to have no answer but which in reality are quite thought provoking. Consider the one "What happens when an irresistible force meets an immovable object?" No answer? Yes there is! Indescribable hell!

Whom do you expect to answer your questions. A hint here may be valuable. Always name the student *after* the question is asked; not before. Obviously, if the name is given prior to the asking the interest of the rest of the class is problematical — are they listening? Why should they, the question was not for them.

[1] Read Cushman's *Formanship Training* (New York: Wiley & Sons), Part III, for a very fine discussion of the conference procedure as a method of teaching.

The Jumping-Off Point

Do you have one? All good instructors do! This phrase was coined by one of our most famous vocational educators, the late Charles R. (Skipper) Allen. What is it? The jumping-off point is that point used at the beginning of every lesson (or should be) wherein the instructor goes from an *old* idea to the *new* one. In other words, the experienced teacher, when starting a new subject, will find something that is familiar to the students on which he can *build* the new topic. There is a J.O.P. in this material (purposely so!).

The idea as to the need of evaluating a house is common knowledge to everybody. All live in houses, either own one or (today, especially) wish they did. Every individual is anxious to know whether he is getting his money's worth. From this idea of *checking up on a house* one can *jump* to the idea of *checking up on our teaching.*

The Four Steps of Good Instruction

There are only four basic steps to follow when putting over any lesson:

Preparation

Put the student at ease.

Find out what he already knows about the job — (The J.O.P.).

Get him interested.

Presentation

Tell him, show him, illustrate, ask.

Make the *key points* clear.

Go slowly — be patient.

Application

Have him do the job, but watch him.

Then have him do it again: have him explain what he is doing and why.

Correct his errors, not critically but kindly.

Continue doing this until *you* know *he* knows.

Testing

Put him on his own.

Check him frequently.

Get him to look for key points as he progresses.

The Teacher and His Administrator

Does the instructor know who he is? Some teachers don't. And who is his supervisor, or is there one?

What about those reports that seem so numerous and take considerable time to make out? No school system could operate without them. After all, said and done, the administrators of public education *do* have to give an account of their stewardship. Are those reports in on time and are they readable?

Instructor's Responsibilities

He should

Acquaint himself with his responsibilities to the principal of his school —

Signing in and out procedures

Procedure for ordering supplies, etc.

Disposition of bulletins, records, and reports

Procedure for reporting accidents

Notifying his school in case of illness or in case it will be impossible for him to meet with his class. This should be done as soon as possible, so that a substitute can be obtained.

Talk over his teaching problems with his principal.

Know where he is going.

Make a simple *trade analysis,* setting up units of training.

Outline definite aims or objectives to be reached upon completion of each *unit* of the course.

Establish policies of conduct for his class.

Finally

The first and last checking point, particularly for the evening school instructor, in spite of what has been said above is quite a simple one: Can he hold a class together? Do the students attend regularly, show great interest and come back for more? If so, he can consider that he is putting his *stuff* across. The suggestions given should assist in making his job an easier but more efficient one, and give him the assurance he is doing a good teaching job. They should also make the work for the students even more interesting.

Summary

As a final check look over the following items and evaluate yourself on a poor, fair, good, or excellent basis. Those items in which your rating is low, should be carefully studied and definite steps should be taken to improve yourself on these points.

A Teacher-Evaluation Check List

1. The classroom atmosphere; ventilation and light — is it O.K.?

2. The attendance of the students; how good is it?

3. Safety practices; are they followed?

4. Are all the students working, or are some standing around waiting for instructions?

5. Does there appear to be a live and enthusiastic interest shown by students in their work?

6. The quality of the students' work; is it good?

7. Student participation; do they take part — all or only one or two?

8. Are students showing marked improvement in their work?

9. Is everything ready for the class so that no time is wasted in getting under way?

10. Are the instructions definite and easily understood or are they hazy and confusing?

11. Questioning: Are the questions good? Are they well selected?

12. Is the instruction proceeding according to learning difficulties, that is, easy to hard?

13. The conference method — is it ever used with the class?

14. Visual aids — are they used efficiently and in sufficient numbers?

15. Blackboard technique — how well is it used?

16. A *road map* or training program — is there one, and is it up to date?

17. Progress chart — is there one, and is it used?

18. Enthusiasm: Does the instructor have any? Teaching is the biggest job in the world. It is dealing with human beings.

19. Instructor's voice — what *does* it sound like? Did he ever hear it?

20. Has he a sense of humor? Is he patient? Does he possess a sympathetic manner?

21. Is he developing a wholesome attitude (morale) among his students?

22. Is he a man among men — enthusiastic, up and coming — with an eye on every student's progress?

23. Does he co-operate in a helpful way with other instructors, principals, and supervisors, that training may proceed smoothly and without interruptions?

24. Are his reports and records complete and accurate, and are they on time?

25. Does he go out of his way if necessary to help students in their work and in their personal problems?

26. Does he possess a deep sense of loyalty to the craft and to the cause for which he is endeavoring to make a contribution?

Teaching can be fun if you know you are getting your subject across. The growth and progress of your students is all the proof you need.

If the student hasn't learned, the instructor hasn't taught.

The Instructor's First Session

1. The instructor should inspire and develop an immediate, friendly, and informal atmosphere — student to student, and student to instructor.

2. Introduce yourself to the group (write your name on the blackboard and pronounce it correctly).

3. Carefully explain the necessary application forms which must be made out by all students, and have them accurately and neatly completed at once.

4. *If appropriate* have each member of the class introduce himself and his background of experiences.

5. If circumstances permit, a *log* of years of individual experience (school or work) may be charted, summed up, and used as an interesting class background and expectancy.

6. Establish your relationship to the group by explaining your position, and *if appropriate* briefly give your industrial background to build personal prestige.

7. Indicate pleasure and privilege for the opportunity of conducting the class.

8. Establish policies and procedures of conducting the class.

9. Show need for co-operation, discussion, and freedom to ask questions.

10. Indicate need for *consistent* and *punctual attendance.*

11. Briefly state the purpose of the course, make a tentative outline of the objectives, and discuss the procedures to be followed to obtain these objectives.

12. Discuss briefly school regulations (smoking on school grounds, parking, etc.) safety practices, occupational policies, and work habits.

13. If manipulative tools and equipment are to be used, a written safety test should be made and signed by every trainee. Safety cannot be given too much emphasis.

Professional standards in teaching are highly important. Each instructor, therefore, should dignify his relations with students and co-workers in every way. The proficiency and effectiveness of his teaching will depend in great measure on his understanding of the problem before him and to the extent he strives for self-improvement.

Each instructor should realize the importance of the *personal* element in teaching. A wholesome co-operative relationship and a sympathetic understanding of the needs of his students are successful factors in good teaching.

Vocational Education and Society

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(*Continued from page 234 of the June, 1947, issue*)

The Course of Study

It is important that everyone concerned with a vocational course should have the same idea of what is being covered in it. Furthermore, it is just as important that each one should be aware of how a particular course is related to any other course which precedes or follows it. The superintendent, the director, the supervisor, the principal, and the teacher, to say nothing of the pupils and interested groups among the general public, should all have a clear picture of what the objectives of the course are, and what plan is being followed to achieve these objectives. In other words, the director must plan the work to be done in his department in a form that will be intelligible to those interested. This plan is commonly known as a *course of study.* After it has been prepared it serves as a chart to guide the teacher over the material he is expected to cover, and it serves as a log by showing what has been covered up to date.

Courses of study appear in many different forms; some simple, some more complex. Regardless of the form, however, they constitute an effort on the part of someone to record for his own use or the use of others what subject matter the teacher will cover in the class for which the course of study was prepared.

One of the responsibilities of the director of vocational education is to announce to the superintendent and others interested what is being done in each class. This announcement serves also as an agreement between the director and the teacher in regard to what shall be taught in any class. This gives the superintendent an understanding of what is being done in each class and enables him to discuss it intelligently with his board and with visitors who may have an interest in the work of the department. It informs the teacher concerning what the director expects to be done. And it forms a basis for the director to check on how closely the teacher is adhering to the plan agreed upon.

One of the difficulties found in some school systems is that, when several teachers are teaching the same subject in different grades or in different schools there is a tendency for each teacher to decide for himself what his course shall be. The result of this is a lack of uniformity in what is taught to comparable groups in different situations in the same school system. One teacher includes a certain unit in Drawing I while another may have the same unit in Drawing II. This makes for confusion in the minds of pupils who may transfer from one school to another or those who are in a position to observe both classes at work.

Because of this the course of study in any subject should be made for the school system as a whole and should not be permitted to develop into a number of independent courses scattered throughout the city. Thus, the course in drawing should include all drawing taught in the school system, from the lowest to the highest. This total drawing area will, of course, vary with the time devoted to the subject. However, the complete course should be divided into convenient units which might be labeled Drawing I, Drawing II, III, IV, etc. This removes the idea of starting drawing in the seventh, eighth, or ninth grade. Regardless of the grade or the school in which a pupil happens to be, if he is starting drawing he starts on Drawing I, and goes through the other units in rotation. This removes the difficulty which appears when a pupil enters a school in the ninth grade from a rural community where drawing was not taught. He is in the ninth grade but drawing was started in the seventh so he is four semesters behind. It might be embarrassing to him if he were asked to start on seventh-grade drawing, but it would be relatively easy to get him started on Drawing I in the ninth grade.

It cannot be said that it is wrong to designate any section of a subject as belonging to any particular grade, but it simplifies the teacher's task when he is able to start the beginner on Drawing I regardless of the grade he happens to be in.

Factors to be Considered

A course of study is not something that can be picked up somewhere and made to apply in any situation.

Each course of study must be tailor made to fit a particular situation, and one rarely finds two situations in which the conditions are exactly similar. Among the factors that affect the content of a course, the following may be found:

1. What is the purpose of the course? Is it industrial arts or trade training?
2. How much time will be devoted to it? One, two, or three semesters? Two hours a week or fifteen hours a week?
3. What equipment is available?
4. What are the limitations of the teacher in regard to the work?

Procedure

There are numerous ways in which a course of study may be prepared. The director may prepare the course himself, he may have a teacher prepare it, or he may have a committee of teachers prepare it. Perhaps the most effective method is to appoint a committee and to have it prepare the outline under the general direction of the director. This is particularly true when work of the same general type is offered in more than one grade. When this condition exists there may be more than one teacher teaching the same subject, and even though they are in different grades, there is a tendency for duplication to appear. If all teachers of the same subject, regardless of grade, participate in preparing the course of study they are forced to reach an agreement on which parts of the subject are the responsibility of each teacher.

The function of the director in this committee is to guide the teachers so that they

adhere to the general plan being followed by committees representing other subject matter fields, and to insure that the plan is likely to achieve the objectives of the department as a whole.

There is no set procedure to follow in preparing a course of study; however, the following steps are suggested as one plan that a director might follow in achieving the desired outline:

1. Call together all teachers from all grades who teach any part of the subject under consideration.

2. Present to the teachers the idea of having a course of study in their subject which would include all of their subject covered in the school system.

3. Suggest to them that this is a job that must be done and that they are being given the opportunity to establish for themselves what shall be taught and where it shall be taught.

4. Point out that if they fail to agree among themselves in regard to the content of the course that someone else may have to decide the matter for them and that this decision is likely to be final.

5. Suggest to the group what might be included in the course and the form in which it might be arranged.

6. Have them list all the things that might be taught in the field under consideration. These need not be in any particular order as this process is intended merely as a means of forcing the teacher to think through his subject to find out what it contains. This is sometimes referred to as *subject analysis.*

7. Select from this list those things they believe may be taught with the time, facilities, or equipment available in the school system.

8. Arrange the items selected in No. 2 in the order in which they should be taught.

9. Divide these items into appropriate groups leading from the simple to the more complex.

10. Arrange the groups in the course of study form agreed upon.

11. Have the results examined critically by other individuals qualified to pass judgment on them.

12. Modify the outline on the basis of the suggestions received if this seems desirable.

Form to be Followed

As has been indicated the form in which a course of study is set up will vary with the subject and with the person responsible for preparing it. In some cases it is merely a topical outline in which are listed the main topics to be discussed and some of the points to be made on each topic. This might look as follows:

Course in Woodworking

I. *Sawing*
   1. Kinds of saws and their uses
   2. Care of saws
   3. Sharpening a saw

II. *Planing*
   1. Order of planing-face-edge, etc.
   2. Use of winding sticks
   3. Care of plane
   4. Honing plane bit
   5. Grinding plane bit

III. *Lap joint*
   1.
   2.
   3.

IV. *Mortise-and-Tenon Joint*
   1.
   2.
   3.

Again, there are those who follow the policy of including in their outline the things the pupil must learn to do as well as what he must know. This form may look like this.

Course in Machine Shop

Must learn to do	*Must know*
1. Chip and file	The different kinds of files and their use That a file cuts on the forward stroke only
2. Drilling	Two kinds of drills and their uses How sizes are designated How to sharpen drill

Course of Study in Woodworking I.

Process or principle to be taught	*Jobs to be used to teach the process*	*Things to be learned which will be helpful in doing the job*	*References*
Planing	1. Breadboard 2. 3. 4. 5.		
Sawing	1. 2. 3. 4. 5.		

In this case in the left hand column the particular process to be taught is listed. In the next column there are several jobs on which the pupil may learn to plane. Some of these jobs are simple, others are more difficult. The purpose is to have jobs for both the faster and the slower pupils and at the same time provide the same training for both. The third column contains the things the pupil *must* learn if he is to perform the operation intelligently. And the last column contains specific references dealing with each operation.

The advantage of this lies in the fact that there is no uncertainty in the minds of those interested as to what is covered in the course nor what the pupils are supposed to learn. Then, too, it makes certain that the teacher has a specific teaching objective for each project the pupils are required to make.

It is probable that the director may have difficulty in convincing the various teachers that they should co-operate in such a plan. However, if a subject is to be covered effectively it is necessary that a definite plan be prepared. It is the responsibility of the director, therefore, to have this plan prepared so that it covers all of the subject that can be taught in the time and with the equipment available in his school system. If he is wise he will assign this task to the teachers in the field concerned, with the advice that they agree among themselves as to what should be taught and where. If they fail to respond, it is his duty to set up a complete plan and to see to it that it is followed. The need for this is particularly necessary in larger cities where there are a large number of teachers located in a great many schools.

This procedure of establishing a course of study and insisting on each teacher following it may lead to the crictism that the director is attempting to regiment his staff and that the plan takes away the opportunity for the teacher to use his initiative. However, the course should show only what is to be taught. The actual teaching and the selection of the method to be used are individual matters to be decided by each teacher for himself. Further, opportunity for exercising initiative lies in the types of illustrative material used and the projects or problems used as vehicles of instruction.

If you take a gun along on your vacation, assure yourself and family that it will remain a wonderful vacation by making sure you handle the gun safely. Thirty-one hundred persons were killed last year in firearms accidents — a rise of 24 per cent over 1945. The tragic part of such cold statistics is that many of these lives could have been saved if a little care had been taken. — *National Safety Council.*

Every great advance in science has issued from a new audacity of imagination. — *John Dewey.*

Train up a child in the way he should go: and when he is old he will not depart from it. — *Proverbs 22:6.*

Some Leaders in Industrial Education

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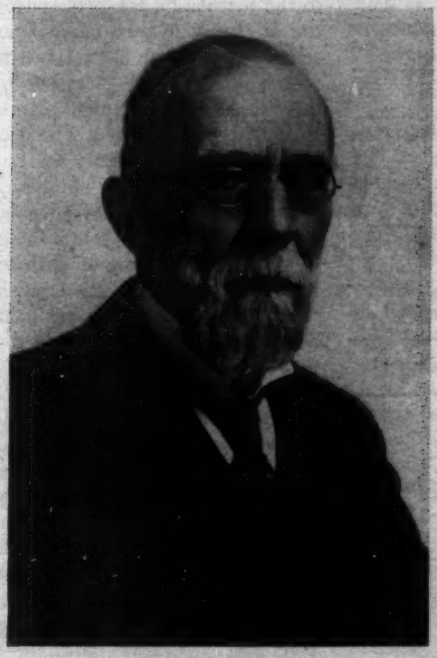
(Continued from page 230 of the June, 1947, issue)

Calvin Milton Woodward

Calvin M. Woodward has often been referred to by writers and speakers as "the Father of Manual Training in the United States." Charles A. Bennett refers to him as "the great American champion of manual training."[1] It is conservative to say that few men contributed more than he in determining the early form and content of shopwork organized for instruction and



Calvin Milton Woodward

methods of teaching, and in arousing interest on the part of educators as well as the public. He was not only an influential leader, and an inspiring evangelist for a new cause, he was a pioneer in the sense of "one who goes before, preparing the way for others." He was indeed a man of vision. For these reasons, every worker in the field of industrial education and industrial arts should know the essential facts about his life and works.

Calvin Woodward was born in Fitchburg, Mass., on August 25, 1837, and died at his home in St. Louis, Mo., on January 12, 1914. He was graduated from Harvard University, Cambridge, Mass., with the degree A.B., in 1860. Upon graduation from Harvard he was awarded membership in Phi Beta Kappa; and years later the Tau Beta Pi fraternity at the University of Illinois, Urbana, made him a member of that honorary society. In 1883, Washington University, St. Louis, conferred upon him the degree of Ph.D., and in 1905 the degree of LL.D.

In September, 1865, he went to Washington University, as assistant principal of the academic department and teacher of mathematics. The next year he became principal of O'Fallon Polytechnic Institute, which became a part of the College of Engineering of Washington University, when it was organized in 1868. A large part of the work of O'Fallon Institute consisted of evening classes for employed workers. In 1868, he played an important part in organizing the college of engineering, and served as dean until 1896. After an interval of five years, he returned in 1901 as dean of the reorganized school of engineering and architecture. He served in this capacity until 1910, at which time he resigned in order to give more time to writing and lecturing.

Practical Education

Bennett remarks that Professor Woodward's experiences with students seemed to point him directly to an interest in and a broad outlook on practical education. The students included boys in the preparatory department of the university, young mechanics in the evening classes at O'Fallon Institute, and college students preparing to be engineers.

As professor of mathematics in the university, he had occasion to teach a class in applied mechanics. Thinking to make the work more objective and more easily understood, he enlisted the aid of the college carpenter, Noah Dean, in arranging the necessary workbenches, tools, machines, and materials for the construction of working models to illustrate the various mechanical principles. It appeared, however, that the students were unable to construct the simplest things with the carpenter's tools. "Instead of giving up his plan for helping the young men to visualize the fundamental mechanical forces, he proceeded to teach them how to use tools." Bennett reports that Dr. Woodward himself said later that he was in this way led to the teaching of shopwork at first, "without any direct or immediate trade or industrial motive, though that appeared soon after."[2]

The starting of these classes in woodwork construction for college students in applied mechanics was in 1870. In 1871 the catalogue carried an announcement of the equipping of a shop for this purpose. In the following year, 1872, "certain tool exercise pieces were devised as the most direct and speedy means of teaching the young men how to use tools." In the following year, 1873, Professor Woodward, in an address at the university, discussed at some length his conception of the place of shopwork in education. He included in his program, which he said should extend through the entire course of four years, woodworking, work in cold metals, and what we now call forging or blacksmithing, machine-shop practice, and drafting. By 1875, he had a well-organized program of shopwork, with courses of study and methods of teaching worked out. This instruction occupied four hours a week of the student's time, through the four years of the college courses.

The Russian Exhibit

With this background it is easy to comprehend why Professor Woodward was so impressed by the Russian Exhibit at the Centennial Exposition, held in Philadelphia in 1876.

[1] Bennett, Charles A., *History of Manual and Industrial Education, 1870 to 1917* (Peoria, Ill.: The Manual Arts Press, 1937), p. 317.

[2] *Ibid.*, p. 318.

In 1830, a school of trades and industries was opened in Moscow, Russia. In 1868, this school was reorganized by imperial decree, and became the Imperial Technical School, for the training of engineers. In that year, the director of the school, Victor Della Vos, and his associates, developed an analysis of the mechanic arts for instruction purposes, together with courses of study, methods of teaching, and plans for equipping and organizing the shops.

The objective as summarized by Bennett, was to teach the fundamentals of the mechanical arts: (*a*) in the shortest possible time; (*b*) in such a way as to make possible the giving of instruction to a large number of students at one time; (*c*) by a method that would give to the study of practical shopwork "the character of a sound systematic acquirement of knowledge"; and (*d*) so as to enable the teacher to determine the progress of each student at any time.

In 1870, the Imperial Technical School exhibited its system of teaching the mechanical arts at the Exhibition of Manufacturers, at St. Petersburg; in 1873, in Vienna; and in 1876, in Philadelphia. And thus was introduced to America what we call "the Russian system" of teaching the mechanic arts.[3]

The major contribution of Professor Woodward, resulting from his study of the Philadelphia exhibit of the Russian system, interpreted in the light of his own experiences at Washington University, consisted in: (1) the discovery that all mechanical processes are capable of analysis into a few simple elements, "just as all the words of the dictionary are but combinations of the letters of the alphabet," and that the most expeditious and most economical method for the learner is to master these elements in a carefully organized sequence before he attempts to combine them in the construction of objects of utility, and (2) the realization that the mechanic arts are capable of being organized for instruction purposes and taught in accordance with the same principles of teaching or learning that apply to science, mathematics, and other school subjects.

Vision of a New Type of High School

Almost from the beginning Professor Woodward conceived of manual training as something that should be a part of the education of all boys, and not reserved simply for those fortunate enough to enroll in the engineering college. His plans for making this ideal effective resulted in the organization of a new type of high school in which organized instruction in shopwork and drafting should have a place just as important as those of other subjects. The Manual Training School of Washington University, in St. Louis, was established by action of the trustees on June 6, 1879, and opened its new building at the southwest corner of 18th St. and Washington Ave., on September 6, 1880, with an enrollment of about 50 boys.

After the school was discontinued, the building was razed and replaced by a business structure. On the Washington Ave. side of the building which now occupies this site is a bronze plaque with a miniature reproduction of the school building in bas-relief, and the following inscription:

> **Organized and erected in 1879 under the leadership of Calvin Milton Woodward, on this site stood the first Manual Training School in the United States. Incorporated under the Charter of Washington University, the Manual Training School functioned successfully until its discontinuance in 1915. Its Motto, "The Cultured Mind — The Skillfull Hand."**

This plaque, paid for by contributions from alumni of the school, was placed by the Young Men's Division of the St. Louis Chamber of Commerce, in 1939.

Personal Recollections

During the period of my connection with the Illinois State Normal University, at Normal, I attended the sixteenth annual convention of the Western Arts Association, which was held in St. Louis, May 4–7, 1909. The Manual Training School was still in operation at that date, and I recall a visit there one afternoon. It was a two-story red brick building, with a spacious hall and stairway in the center, and shops on both sides. On the first floor were the two metalworking shops, one for forging and blacksmithing, and the other for machine-shop practice. On the second floor were the carpenter shop and the wood-turning shop.

In those days individual motors for machines were the exception rather than the rule. At least these shops had not yet been converted to individual motor drive. The lathes and old-type grindstone in the wood-turning shop, and all machines in the machine shop were driven from long line shafts, through countershafts and overhead belts. This equipment would seem like an exhibit out of a museum to the student who is privileged to work in a modern industrial-arts shop.

Several sessions of the 1909 convention of the Western Arts Association were held on the campus of Washington University, west of Forest Park. The passage of nearly 40 years has dimmed my recollection considerably, but it seems to me we were permitted to visit the old dormitory building, which had been converted into a shop building in 1877, after the first shop of 1872 had been outgrown. It was in this building that Professor Woodward and his associates carried on the activities and experiments, from 1877 to the fall of 1880, that led directly to the formulation of plans for the manual training school.

At one of these sessions of the 1909 convention Dr. Woodward appeared on the program. To the best of my recollection this was the only time that it was my privilege to see and hear him. It has been said that one does not develop the historical sense until he begins to grow old. Whether that be so or not, as I look back to 1909, I realize now that I was not adequately impressed by the historical significance of the events that occurred on that visit to St. Louis.

However, I do recall Dr. Woodward's appearance on the program, and the enthusiasm with which he was received by the audience. There were some at least who were old enough to appreciate what was going on. Dr. Woodward was a man of medium height and weight; with graying hair, and with full beard which was much more common in those days. He was a man of more than usual energy, a vigorous and forceful speaker, and in great demand as a speaker before audiences of business and professional men, manufacturers, and others, as well as before audiences of educators. He spoke as one having intense convictions, and as one who had worked over his material to the point of being sure of his ground.

The record shows that he was not only a very persuasive speaker, but equally influential as a writer. Many of his addresses were printed in full in the *Proceedings* of important organizations, and were widely read. He was also the author of several books, chief of which was *The Manual Training School*, published by D. C. Heath & Co., Boston, in 1887. It is scarcely possible to overestimate the significance of this book in promoting the cause of practical education in its early stages!

The St. Louis Manual Training School, opened under the auspices of Washington University, was of course a private

[3] *Ibid.*, p. 42.

school for boys. But it attracted world-wide attention almost from its inception. Based on a foundation of general education, at the scholastic level of the high school, this school became the leading educational experiment of its time, and was the model for similar schools to be established in other cities shortly thereafter.

According to a report of the U. S. Commissioner of Education, Dr. Woodward declared that the essential feature of manual training is "a systematic study of tools, processes, and materials," and he urged that such work be adopted by schools not only to aid those inclined to industrial life, but also as a means "to enable those who have no career in mind to discover their inborn capacities and aptitudes; whether in the direction of literature, science, engineering, or the practical arts." He often declared that his objective was "to put the whole boy to school."

The dual purpose which he consistently emphasized and advocated was well phrased in the famous motto inscribed over the entrance to the school at 18th St. and Washington Ave.:

Hail to the skillfull cunning hand!
Hail to the cultured mind!
Contending for the world's command,
Here let them be combined.

During the winter of 1885–86, Dr. Woodward accepted an invitation from William Mather, a member of the British Royal Commission on Technical Education, and delivered a series of lectures on manual training and its place in education at educational conferences in England.

He was a member of the St. Louis board of education from 1877–79, and from 1897–1911, serving as president of that body for three terms. He was a member of the Board of Curators of the University of Missouri from 1891–97, and served as president of the board from 1894–97.

Dr. Woodward's greatest influence on manual training in the public schools of St. Louis was felt during the time he served as a member of the board of education. At a meeting of the board held on November 9, 1897, he offered a resolution providing for the appointment of a committee "to inquire into the matter of manual training . . . upon the extent to which manual training has entered into American education, and upon its educational value." The resolution provided, further, that if the committee found the subject worthy of consideration, it should submit a plan for introducing it into the St. Louis schools.

On April 12, 1898, the committee, with Dr. Woodward as its chairman, presented a voluminous report comprising investigations of all cities of any consequence in this country, and in Europe as well, and recommended that, as soon as means would permit, manual training should be included in the elementary and secondary schools of the city.

By action of the board of education, manual training was made a part of the regular work of the public schools of St. Louis beginning with the year 1899–1900.

Because of his epoch-making contribution in founding and organizing the St. Louis Manual Training School, and because of his energetic and successful advocacy of this new type of education through his writings and public addresses, Dr. Woodward holds a conspicuous place as a leader among the leaders in industrial education and, as we know it today, industrial arts.

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A general shop arrangement

Industrial Arts and Vocational Education
John J. Metz, Editor

SCHOOL YEAR 1947–48 ABOUT TO BEGIN

Vacation time is drawing to a close, and the first day of school confronts students and teachers alike. For both, that first day holds much that is problematical. Of course, the student cannot do much to prepare for the opening day, especially in the subjects that are new to him, but the instructor can make preparations for that first lesson in such a manner that they will affect the efficiency of his work during the entire school year.

Instructors who have had years of teaching experience, need read no farther. Really, this editorial is not for them at all. It was written for the beginning teacher who has probably had but a few hours of practice teaching and is now nervously looking ahead wondering how he will get by with his pupils on the opening day. No doubt, he has been well prepared by his instructors and professors at the teacher-training institution which he attended. Yet there is always the fear of those unknown factors which surround anything that is to come upon us at a future date.

Probably the first question such a teacher might ask himself, is: "What is the end toward which my work is to be directed — what are the objectives of my course?" To help him answer this question, Glenn D. Warrick has contributed an article entitled "Industrial-Arts Objectives" for this issue.

Then, since the new teacher is embarking on an entirely new trip, he might ask himself "Have I provided myself with a good road map? Or, where can I get such a map?" No doubt during his days at college he had to prepare outlines of instruction for several different kinds of courses. It is well to get these out again, and look them over carefully. Are they in such shape that they can be used as a road map for the coming year? Will the work contained in the outline, fulfill the requirements of the objectives of the course which he is to teach?

A search through back copies of this magazine will aid him in making a course outline, as will also a perusal of the A.V.A. publication entitled "Improving Instruction in Industrial Arts."

After the instructor has reviewed the objectives of his work, and after he has prepared his outline of instruction, he must spend some thought and planning on the physical make-up of his shop.

Will a rearrangement of the benches and the equipment make it easier to do a successful job of teaching? If so, is there still time to make the necessary changes? At any rate, make a plan to show what should be done.

Can something be done to make the shop more attractive to the student? Has any thought been given to the material to be used on the bulletin board throughout the year? A bulletin board can be a valuable teaching aid, but it also can be an awful eyesore. It is well to gather some useful display material now. Put some of it on the bulletin board; it helps getting the class off to a good start.

Finally, the new teacher should study himself. Probably J. D. Wilson's "Earmarks of a Good Teacher," which appears elsewhere in this issue, will help him avoid personality traits that will make him disliked by the students as well as by the other faculty members.

As already stated — there is still time to make the first lesson on the opening day thoroughly worth while. Prepare for it now; it will pay big dividends throughout the coming school year.

PUBLICITY FOR INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

The beginning of a new school year is a good time to inaugurate some of the things which may have not received as much attention during the last year or years of our endeavors in the school shop.

One of the activities frequently overlooked is the advertising of what is being done in our shops. It is not boasting to call attention to a piece of good work well done. The students like to hear that their work receives commendable recognition. So do the parents of the students. The community, too, is glad if it can be proud of what is being accomplished at their school.

Unless, however, some publicity is given to work that deserves more than a passing glance, few even within the school will know anything about it.

Make plans, therefore, to pay attention to publicizing your work during the coming school year. Let the new students know what they may expect to do in your shop. Try to have some pertinent bit of news about your work on the general bulletin board each month. See that it is prominently displayed. If possible, also, have some of the students' work shown from time to time. Avoid personal references to yourself, but show what the students have done, and do not fail to have their names on the display with the projects they have made. With the student's name show also his age and the grade which he is attending.

For the sake of internal publicity which will increase the standing of the teacher in the eyes of his students, have a few well-made objects in the shop which you yourself have made. It is well to show the students that you are capable of doing high-class work yourself.

This thought might give some teachers the idea that it is well to make things during class periods. This is not to be encouraged, however. In an article entitled "Stay With Your Students," which appears elsewhere in this issue, the point is made that the teacher should remain in the room during the class period. This point is well taken, but the teacher's work in the classroom must concern itself with the teaching of the students, not with the performance of some private undertaking.

The students will have ample opportunity to check up on the teacher's ability while he gives them demonstrations on how to handle the tools in the performance of the work required in the making of the projects produced by the students themselves.

Then get something about the school shop into the local papers from time to time. Remember to get the principal's approval before submitting such an article. Again — this publicity should present the school and not the individual teacher to the public.

Many stores will be glad to permit a school to stage a display from time to time. This is a fine way of making friends for the school and for your department. Take advantage of all of these methods of putting industrial arts and vocational education before the public.

Inherent Therapeutic Values in Industrial Arts

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(Continued from page 241 of the June, 1947, issue)

Industrial Arts, an Important Stabilizing Factor of Youth

The Challenge. The war has ended. The ending of this prodigious destruction of life and wealth has created many new and brought to life many dormant problems which clamor for solution. Many of these problems are to be found in the field of the mind. Problems in this area, which in normal times would have passed by unnoticed, have been accentuated and brought into focus by the strains and stresses of the recent past. These emerging problems cannot be ignored or postponed; they must be faced here and now. All agencies must work together: the church, the home, the school, and the community as a whole. Especially the school, because of its strategic position in a community, must assume its full share of this responsibility, and do all it can in furthering the physical and mental well-being of all of its charges. Every teacher should be cognizant of these pressing problems. The one great question every teacher should ask himself is this: "What changes in the lives of my pupils do I want this subject to affect, and what should it contribute to their emotional and mental stability?" This question implies a specific direction, as well as definite goals. To be effective, there should be a reasonable degree of unanimity among teachers as to what these aims should be and how to realize them.

The Normal Life. The ultimate aim of all education should be efficient, healthy, happy, and normal life. Authorities tell us that the fundamental phases of all normal life are purposeful work, directed play, and systematic exercise. These three factors are essential in one form or another to all human beings if they are to remain physically and mentally fit.

It is universally recognized that man has an instinctive, irresistible need for purposeful activity. This drive assumes the character of a psychiatric axiom that the approach to a healthy life should be based on reality, on firsthand knowledge of qualities and things. The direct knowledge of the underlying life forces of a cabbage plant is of greater value for a healthy life "than academic aquaintance with the dialogues of Plato!" Sanderson of Oundle, the well-known English schoolmaster, said that "The fundamental instinct of life is to create, to make, to discover, to grow, to progress. Everyone, in some form or another, has experience of this joy of creating; the joy of seeing the growth, the building, the change, the coming. . . . Boys come to school *to do something*, and not to learn. Learning will come as a byproduct."

This activity drive of the individual is always operative and must have an avenue of outlet. Suppression of this drive may and does cause many kinds of disaster, both for the individual and society. This avenue for self-expression and creative activity in our schools is provided in a large and telling measure by the industrial-arts subjects. In one or the other of them, the individual will certainly find the means for the satisfaction of his aesthetic, altruistic, and gregarious needs.

In their very nature, industrial-arts subjects follow man's deep natural urge to translate thought into manual skill, and manual skill into thought. It is a creative experience which teaches the youngster to co-ordinate the act with the correct thought pattern; leading him "to associate thought with foresight and foresight with achievement." The hand and the mind run like a shuttle, back and forth, weaving a strong woof for the warp of the mind. Boris Blain, a teacher of sculpture in Philadelphia, is quoted in the *Art Digest* as saying: "I had neurasthenic patients who were completely cured by being taught to do creative work with their hands. A famous neurologist of Philadelphia has expressed the opinion to me that *if similar work could be done by all school children it should become unnecessary to build more asylums.*"

Is it not true that, basically considered, sculpture is only a glorified industrial-arts subject: Its medium of expression is some solid substance, and the means of expression are the human hands working upon this medium. This activity, therefore, is akin to those of industrial-arts subjects. If sculpture has such a beneficial influence upon the unbalanced mind, it may be safely assumed that industrial arts, in their totality, will exert an equally beneficial influence: (1) upon "the borderline" minds of the pupils, thus preventing any possible breakdown in the future, and (2) upon the "normal" minds, thus increasingly stabilizing and strengthening them.

This being the case, let us now scrutinize the industrial-arts field more in detail in order to find the basis upon which to rest this claim.

Industrial Arts Gives Purpose and Direction to the Activity of the Individual. Industrial-arts teachers are gradually discovering the possibility of teaching boys and girls to think with their whole bodies. This discovery, if extended to other areas in the curriculum, will surely mark the dawn of a new era in education. An activity in a shop occupies the whole individual. Here he *must participate* as a whole person: physical, mental, emotional, and aesthetic. This activity pattern implies the concept of integration, both in the physiological and social sense. An integrated person is one who is "all there." When one thinks with his whole being, there is neither time nor room for upsetting introspection.

Industrial arts also carries with it the concept of "engine and rudder." The pupils' interest and enthusiasm in the shop activity furnishes the power, and the plan of this activity indicates the direction or "rudder" which steers the activity to a successful completion. It is the "engine-less and rudder-less" persons who are facing disaster ahead. These are the ones who are tormented by many imaginary ills. These are the people who are ceaselessly searching for the elusive "cure-alls," and who make the myriads of quacks and faddists happy and prosperous. They fail to realize that the only cure for them is a job — "real work to do" — something to live for.

Industrial arts presumes to do this very thing for our youth. It builds the pupils' morale by developing their interests in reality, and creates in them self-confidence and initiative through purposeful creative activities in the shops. This activity is distinctly therapeutic in its results.

Industrial Arts Develops the Sense for Order, System, and Logical Procedure of

Work. By its very nature, industrial arts is compelling in its demands upon the pupils' ingenuity in planning his work in the shop, and carrying out these plans to a predetermined conclusion. The job must be thought through step by step and all of these steps must logically dovetail into each other. The resultant training of this exacting thinking process is of great value, because the youngsters become habituated to orderly, useful habits, and attitudes in thinking and doing. Tied down to reality, there is no opportunity for daydreaming or for taking distant excursions on a cloud.

Industrial Arts Develops the Power of Observation, Visualization, and Imagination. Planning of any activity involves these three qualities of mind. Every detail of the project must be observed and visualized, and the proposed project must be seen in one's mind in its completeness. This intense mental activity takes place before a lick of work has been done on the project. The object has been conceived and executed in one's mind, as it were. Later, these mental pictures are reproduced in concrete form in wood, metal, or any other material. The mind is thus integrated with reality, which gives it weight and substance. This is also therapeutic in its results.

Industrial Arts Develops the Habit of Quick and Concentrated Attention. The use of all tools involves close attention. Especially is this true in the use of power machines. Certainly there is no time to think about one's real or imaginary ills, cares, or annoyances while operating a jointer or a circular saw. The pupil *must* be all there, or else disaster will overcome him either in the form of a grave injury or a possible death. This habit of paying close attention to whatever one does with tools and materials will undoubtedly tend to prevent the individual from becoming too engrossed with himself, which in turn will give him greater emotional stability because of reduced internal tension.

Industrial Arts Trains the Pupil to Discern Beauty in Things and Qualities. The appreciation of beauty in form and color is no more the exclusive possession of the few. Today people demand beauty in such everyday things as textiles, dinnerware, and even the trains must shed their ugliness and submit to the prevailing standards of form and color.

Leading educators have recognized this trend. They have become convinced that beauty in form, color, and design is a basic necessity in the lives of our pupils.

Industrial arts, having as many by-products as coal does, is in a position to satisfy this fundamental need to a high degree. Of all the different materials used by the industrial-arts subjects, wood is perhaps the most striking medium. It produces exciting visual and aesthetic experiences by its strange multicolored patterns. Consider such woods as black walnut, white oak, or even the humble yellow pine. Each one of these has a beautiful color and keenly interesting grain pattern, all its own. Are plastics in their varying colors and definite texture without beauty? This may be said of many other materials as well. Whether a thing is beautiful or not depends to a large extent upon the point of view and the fine discriminating sensibilities of the observer. Daily handling and observation of such materials is bound to affect the finer feeling of the pupil. He may become deeply absorbed by these qualities, thus closely tying his inner self to these external realities, which without doubt tend to produce a rational, balanced emotional existence. This fact, psychiatrists tell us, is of distinct therapeutic value for the normal as well as the abnormal mind, because the directness of the contact of the exterior world with the sensory apparatus produces more vital, more sincere, and more dynamic experiences, which in turn act as a tension releasing mechanism.

Industrial Arts helps to Discover Vocational Interests. If industrial arts did not contribute anything else to the welfare of the individual but helped him to discover his future life's work, this alone should justify its being in the curriculum. One is apt to overlook the effect of the vocational side of life upon human happiness and social well-being. How many of our high school boys and girls definitely know, even a few weeks before graduation, what occupation they will follow? They, as well as their parents, are bewildered as they face the necessity of choosing their life's work in a fast changing economic world. Choosing a vocation wisely is indeed a great adventure! There are literally myriads of men and women in this world who have missed their vocation in the full meaning of the word. Such unfortunates never find much satisfaction in their occupations. A man is in misery indeed who cannot see anything alluring or thrilling in his vocation, who must drag himself every day to his place of business. Such a situation constitutes a prolific source of discontent, unhappiness, mental dislocation, and in some cases a possible disaster to the individual and to society. A judicious vocational choice is therefore of great importance for the physical and mental health of the individual, for it must bring unending satisfaction and happiness so necessary for emotionally stabilized life. In the school many boys and girls come in contact with various activities in the shop. A great number of these are prevocational in nature. For this reason, the pupil will become acquainted to some extent with the real vocations. It is very probable that this situation will help not only to discover but also to develop and strengthen his vocational interests.

In this respect industrial arts renders a real, vital service to our youth who come in direct contact with its radiating influence.

Industrial Arts Also Helps to Discover Avocational, Leisure, or Hobby Interests. Our industrial civilization has now reached a stage in its development where work hours must be reduced in order to prevent overproduction. Now a forty-hour week is the accepted standard as contrasted with seventy or more hours a week several generations ago. Improved methods of production and constantly invented new and better machines are greatly increasing the output, thus reducing the hours of work. Man is being rapidly liberated from spending all his waking time in making a living. He is having increasingly more hours of leisure than of work. How to use this time thus saved? Wisely used, leisure is an invaluable gift of our civilization, which offers never before existing opportunities for personal growth.

This overabundance of leisure has been thrust upon man overnight, as it were. His one week of living may be subdivided as follows: Work 44 hours, sleep 56 hours, leisure 68 hours. For many years he has been taught to work efficiently and scientifically. Production and ever more production was the slogan of the past, not to work productively was considered a mortal sin. Thus conditioned, can man become a wise user of leisure in no time at all?

Leisure is a challenging problem for the schools to solve. In the past the chief function of the school was to train youth to take its place in the ranks of producers. Now the schools must also teach the youth how to spend his leisure wisely, how to live abundantly while not working, how to develop worth-while interests, and how to develop satisfying hobbies. The future of a nation may well depend more upon how leisure is used than upon how work is done. Psychiatrists tell us of the "close relation that the gangsters and clever crooks of today bear to the juniors of yesterday who got in the jam." The greatest menace to any nation is found in the dangerous combination of idle hands, empty heads, and strong emotions. If these heads can be filled with socially desirable ideas and ambitions, the hands will no longer be idle, but will be engaged in socially as well as individually gratifying constructive pursuits.

It is well to remember in this connection that absolute idleness is an impossibility. Human nature is dynamic, ever searching

for expression. Any attempt to suppress this drive of surplus energy will result in powerful inner tensions. These explosive tensions if unduly prolonged and not released in some approved channels will result in deeds that will seriously affect the mental and emotional life of the individual. This may explain the ever increasing delinquency among the "teen" agers. It is apparent that these drives for expression may find a satisfying release in some hobby. What can the school do in fostering desirable hobby interests? It can do a great deal if it is at all aware of the challenge confronting it. Especially industrial arts is in a position to be of real service to our youth, because of the great variety of offerings in this field. Because of this fact, a youngster may find an activity among them which may serve him as a leisure time occupation, as a tension releasing mechanism, through life. This fact again serves to indicate the therapeutic value of industrial arts.

Industrial Arts Develops Discipline of the Real Sort. What is discipline? There is no agreement on its definition. There are many opinions as to what discipline is in itself, and what it should do for the individual. This fact may be attested by the examination of any standard dictionary. One dictionary definition of discipline describes it as being a "persistent, active, and self-directed pursuit of some selected course of action, even in the face of obstacles or distraction." Whether this is a good, acceptable definition is a matter of one's point of view. Many progressive teachers will accept it as adequate. A discipline that presumes to claim any therapeutic values must have its point of origin in two sources: the *self*, and the *environment*. Whatever one does must be done thoroughly, completely, to the best of one's ability. The pupil should never permit himself to say, "It is good enough." Real self-discipline demands this question to be directed at oneself: "Is this the best I can do?" In the school shops especially this kind of discipline can be readily developed. Any errors, careless workmanship, or poor planning will appear in all of their glaring reality, pointing an accusing finger at the creator of them. These Gremlins will shriek into the ears of all shoddy, careless workers that "the only way to learn to do great things is to do small things well, patiently, loyally." This disciplinary act demands the complete co-ordination of the pupil's mental and physical forces, thus enabling him to develop and strengthen the whole of himself. Any indication to daydreaming will be dispelled like dew in the sunshine, for one cannot indulge in idle fancies and carry a project to successful completion.

The materials as well as the tools produce disciplinary effects upon the pupils. Every tool and every kind of material should only be handled in one way, *the right way*. Any other use will carry loud protests from the abused implement or material. Every tool when properly used has a song of its own. This sound is the best indicator of the mental condition of the pupil. "A carpenter's handsaw interrupts its rhythmic chant with a shriek of pain if asked to bite through a nail." At the same time it also announces the pupil's carelessness to the whole world. How will he accept this accusation? Will he try to avoid such carelessness in the future? Many will. This is real discipline, which, resulting from the hard realities of life, is bound to exert a steadying influence upon the emotions and the mind of all our pupils.

What the school shop contributes to the creation and development of the right kind of discipline is eloquently expressed in the following quotation (source unknown): "The value is in every single step of both plan and execution. You can plan, but cannot execute, an impractical thing. *And the practical thing to which you are reduced suppresses those extravagant fancies with which you began; in other words, disciplines your imagination. You are up against inexorable things. Tools are inexorable things.* If they aren't used exactly right there is the evidence. A square and a level and a plumb bob are absolutely final and positive definitions; and you rejoice with an inward joy in your surrender to the dictates of these judges of manual righteousness.

Materials are the most perfect medium for the experience which shall illuminate the soul and ripen the mind; for they oppose your effort, and against that beneficent and lovely resistance you work out your ideas, with patience, with forethought, with skill, with pride, with self-revelation. . . .

For by the way of the hand, the mind still travels the enticing road to *self-expression* and self-fulfillment and to that most priceless sort of happiness which is *poised upon itself.*"

Industrial Arts Promotes the Socialization of the Individual. The socialization of the pupil is perhaps one of the most important aims of education. Man must not only know how to make a living, but must also know how to live in a social group. Only through socially adjusted personal interrelationships can the individual lead a healthy and balanced life. The process of socialization of the person has been recognized by psychiatrists as of paramount importance in the cure of the mentally ill. "One of the very first attempts of the therapist is to break the chains of total individualism of the patient and to bring about socialization of the individual." Similar thoughts are expressed in this quotation: "The re-education of the insane depends *entirely* upon the replacement of bad, perverted, peculiar, slovenly, and *unsocial* methods of reaction by habits which are *social* and *conventional.*" In other words, socialization is synonymous with health and mental stability.

What bearing has all this on the activities in the school? One may object by saying that no school is an insane asylum, and the students in it are no "crackpots." True. However, if the continuous process of socialization affects an ill mind beneficially, why would it be illogical to expect this same process to achieve a more telling effect upon the normal minds of our pupils? The school shop produces a social atmosphere in which all the pupils must live and work, rub shoulders, as it were, share their tools and work experience; help each other, advise and instruct each other. It is a give-and-take proposition originating with the teacher and radiating down to the first semester freshman. These lessons on how to live and work with others, learned in a genuine social situation, are bound to pervade the pupil's whole being. This subtle, all permeating socializing influence generated in real life situations in the shop is of great, therapeutic value. This should be recognized and utilized by all industrial-arts teachers.

Other positive, therapeutic factors inherent in industrial arts could be named, but the ones already enumerated and discussed should be sufficient indices of the great significance of industrial arts in the scheme of education.

Summary and Conclusions

By way of summary, it may be said that this survey of the inherent therapeutic values of industrial-arts subjects has revealed these facts: (1) that more than a third of our people are emotionally and mentally affected in various degrees of severity; (2) that this emotional-mental instability manifests itself in various ways such as law violations, juvenile delinquency, drug habit, gambling, and in many other antisocial patterns; (3) that the proneness to emotional instability may be inherited, or it may also be produced by modern high-tension living; (4) that the transition from emotional instability to mental deterioration may be gradual or rapid and that the forward surge to personality disintegration is inevitable if nothing stops its progress; (5) that occupational therapeutics employs arts and

crafts and other occupational means to steady emotional instability and to aid in effecting cures in mental illness; (6) that the beneficial effect of the industrial-arts subjects upon the unstable emotions and the distraught mind lies in the close reciprocal relationship that exists between the mind and the senses, especially the hand which provides the avenue through which contacts may be re-established with the outside, realistic, concrete world and the mentally oppressed and emotionally harassed individuals; (7) that the industrial-arts subjects in the school shops function in a subtle indirect way as tension releasing mechanisms, thus stabilizing the pupils' emotions, and strengthening their mental balance.

In brief, this survey pointed out many disquieting problems, and indicated what the schools in general and the industrial-arts departments in particular may contribute to the solution of these social problems.

As industrial-arts teachers, we can do these things: (1) to recognize the existence and the seriousness of mental-emotional problems; (2) to carefully observe and scrutinize our pupils for the existence in them of emotional tensions, to determine what produced them, and then to provide the occupational means for the release and dissipation of these tensions; (3) to take upon ourselves the mission of convincing the school administrators, the parents, and the community of the great importance of industrial arts in the scheme of education.

Because of its great therapeutic values, industrial arts should be made one of the "must" subjects so that every boy and girl may come under its beneficial influence. It should be placed in the category of required studies.

If we all work to that end, industrial arts may be made to occupy the top rung of the educational ladder.

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State Syllabi in Industrial Arts

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In view of recent changes in the types of work sampled by industrial-arts courses, and in view of anticipated postwar advances in industry, it seems certain that course offerings and subject content in this field are being subjected to very critical analysis. Most teachers in the scattered schools of any state may be depended upon to revise their instructional materials without suggestion or aid from outside sources. However, such teachers may be assumed to welcome a continuance of the practice of state departments of education in providing syllabi or course of study bulletins.

These state syllabi are helpful to instructors and administrators in the industrial-arts area of the curriculum, and are not intended to go far in the direction of standardization or control. Officials in some states have issued such publications and revised them frequently, while the guides in other state departments have been permitted to grow old, or to become out of print. It may be anticipated that new booklets and revisions will be made in uncommonly large numbers in the near future because of the circumstances born of depression, war, and peace time.

The writer has recently completed a study of such publications of this nature as were then current and available from the several states. He feels that the readers of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will be interested in the selected findings, and he has the hope that this data may aid our profession in having more and better publications of this type to guide us in our work:

About one half of the states now have bulletins of the kind referred to, some of them ancient and probably of little use for the present and future. The report which follows has resulted from a canvas of 23 pieces of this special literature. The details shown have seemed to be pertinent and suitable in amount for a magazine article.

Mechanical Features of 23 Bulletins

General Characteristics

Dates of publication. The 23 syllabi which were examined spread themselves evenly over the 15 year period from 1930 to 1944. Minnesota and Washington shared honors for last place in having the oldest of these bulletins, while New York and Oklahoma headed the list in terms of recency. In two cases, states brought out new courses over a period of several years; New York with dates 1934–44 and Oklahoma with dates 1942–44. It may be assumed that these and other states have arrived at a policy or practice of periodical revision or new issue of syllabi or parts thereof.

Page size. As to page sizes, the bulletins

fell roughly into two groups; those made up 6 by 9 and those 8½ by 11 in. Those of the smaller size were twice as common as those of the larger, but the larger seems to have been growing in acceptance in the last third of the 15 year period.

Number of pages. The number of pages in bulletins is a feature connected closely with page size, and the two items must be considered together for comparative purposes. Nineteen of the twenty-three syllabi that were examined contained industrial-arts material only. In the other cases, industrial-arts was carried with other special phases or included in a general curriculum bulletin. There was wide range in the number of pages devoted solely to industrial-arts. New Mexico ranked lowest with 1½ pages, and New York highest with 897 pages. The average for the 23 offerings was 172 pages.

Printing and binding. Two thirds of the syllabi were printed. The states having the largest bulletins usually prepared them in mimeographed form. The most common form of binding was that of gluing and stapling, this method being used in 20 of the 23 publications. The others were either spiral bound or held together with paper fasteners.

Major Divisions

In addition to the main body of the content, such as objectives, instructional units by course fields, etc., nine other divisions or parts were found in one or more of the 23 syllabi, as is shown in Table I.

TABLE I. Major Divisions — Frequencies of Use

23 State Syllabi on Industrial Arts

Preface, Foreword, or Introduction	23
Table of Contents	23
Title Page	21
Gen. Bibliography	11
Appendices	7
Aknowledgments	6
Index	2
Conclusion	1

Preface, Forward, or Introduction. Each of the 23 syllabi had a section which would qualify as an introductory section or chapter. These chapters varied widely in their content.

Table of Contents. Each of the states offered a section devoted to the contents of the bulletin. Some of these entries were extensive lists, requiring several pages to cover and indicating page references. Some few took only one third of a page and omitted page references.

Title Page. Twenty-one of the 23 publications had title pages, those from Arizona and Kentucky being the two exceptions noted.

General Bibliography. Eleven of the 23 syllabi provided places for the showing of bibliographical references, while in the remaining ones such particulars were interspersed with the course materials. In the latter cases the lists were less extensive and consisted chiefly of suggested text or reference books. Nine different kinds of references were listed, as indicated in Table II. This table also shows the frequencies of use of each kind of reference in the 23 syllabi.

Special subjects, texts, and reference books were mentioned in 19 of the bulletins. Magazines, as such, appeared 11 times. Manufacturers' charts and catalogs, and professional books for the instructor, were each listed in ten of the bulletins. Only five states offered references on motion pictures, slides, and other visual aids.

TABLE II. Bibliographical Lists

23 State Syllabi on Industrial Arts

Special subjects, text, and reference books	19
Magazines, as such	11
Manufacturers' charts, and catalogs	10
Professional books for instructors	10
Motion pictures, films, etc.	5
Periodical references	3
Industrial tests	3
Shop annuals	1
Instruction sheets	1

Nature of the Content

A. *OBJECTIVES*

It is logical to consider the aims or objectives of a certain subject before giving attention to content, method, grade-placement, etc. Statements about objectives, found in the state syllabi of industrial arts, are of two kinds; those of a general nature about the department and those for a specific course within the larger field. As there was much divergence in the courses outlined in the different bulletins, it seemed best to confine study to the more general objectives.

There were 25 different objectives listed in the syllabi canvassed. The bulletins of four states failed to include any general objectives, while that of one state listed 15. The approximate average number was seven per state. Table III lists 25 objectives in the order of their frequency of occurrence. The first objective: *To develop elementary skills in the use of common tools and machines,* was found to be the most commonly mentioned — and so on to the objective: *To develop power of observation,* which was found in only one bulletin. It should be noted that the first seven objectives fall very close together in frequency. This may be explained by the fact that many of the states used, complete or in modified form, the objectives set forth in the American Vocational Association's bulletin entitled *Standards of Attainment in Industrial Arts Teaching.* Some of the less frequently mentioned objectives seemed very unusual to one acquainted with the recurring statements of the purposes of our subjects.

TABLE III. General or Field Objectives

23 State Syllabi on Industrial Arts

To develop elementary skills in the use of the common tools and machines	12
To provide a means of vocational guidance	11
To develop the ability to select wisely, care for, and use properly the things one buys	11
To develop an appreciation of good workmanship and good design	11
To develop the habit of an orderly method of procedure in doing anything	11
To develop the habit of careful and thoughtful work	11
To develop an attitude of readiness to assist others	11
To develop an interest in industrial life	10
To develop desirable habits regarding safety	9
To develop an attitude of pride in one's ability to do something useful	7
To develop the habit of self-discipline	7
To develop a knowledge of mechanical drawing and the ability to express and interpret ideas in that form	7
To prepare for a successful entrance into a vocation	6
To develop a feeling of self-reliance	6
To develop a thoughtful attitude in the matter of making things easy and pleasant for others	6
To provide for leisure time and avocational activities	5
To socialize the pupil and develop citizenship	5
To develop skills sufficient to make minor repairs in the home	4
To provide a means of applying academic subjects to industry	4
To provide exploratory experiences in different lines of work	3
To develop initiative and creative expression	2
To provide opportunity for developing correct attitudes	2
To provide opportunity for giving physical expression to thinking	1
To exercise the large muscles upon which good health depends	1
To develop power of observation	1

(To be continued)

Two fifths of all grade crossing collisions in 1944 occurred at the busy crossing protected by gates, lights, bells, or watchmen!

Drive right and more pedestrianas will be left.

Famous last words: Remind me to have these brakes checked — tomorrow.

Items to which the National Safety Council calls attention.

Industrial-Arts Objectives

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The fundamental purpose of this study has been to determine the existing general postwar aims or objectives of the industrial-arts programs in the secondary schools of the North Central Association.

The study is based upon an analysis of previous thesis studies, books, and periodicals. The ample information gained in this survey of educational materials was developed into a questionnaire which listed the 15 highest rated industrial-arts objectives taken from the reviewed material. Seven hundred and twenty-one industrial-arts instructors in the North Central Association were asked to classify the objectives as to their relative importance and add any objectives which they thought still played an active part in an industrial-arts program and should be included in this classification. Two hundred and eighty-six responses were received from the industrial-arts instructors in cities having a population of 10,000 or more, of which 274 replies or 38 per cent were usable.

Summary of Findings

The industrial-arts objectives which were found to prevail in the books and periodicals reviewed represented the thoughts and experiences of many prominent leaders in this field. Each author's interpretation of any single objective was taken into consideration, and one statement or objective was formed which incorporated within itself the thoughts and ideas of the authors who had listed that objective as one which industrial-arts instructors should endeavor to establish in their teaching.

The following objectives represent the top 15 of a condensed list of 37 objectives used as the basis for this study:

1. *Knowledge of Industrial Procedures.* To develop an interest and understanding of representative industrial environments through information, observation, and study of methods, materials, and processes of production and distribution, and the representative workers and working conditions in their fields.

2. *Consumer Knowledge or Related Information.* An evolutionary improvement in the knowledge and ability of prospective consumers in reference to appreciation, selection, care, and use of all industrial materials.

3. *Skills and Techniques.* The development of skills and techniques in the use of common tools and machines; and a working knowledge of the qualities and characteristics of the most often used materials sufficient for the purpose of fulfilling the needs of an average citizen.

4. *Exploratory Opportunities.* Exploratory and finding values through developmental shop or laboratory type experiences, revealing student interests and aptitudes for possible vocational pursuits, leisure time activities, or the selection of other courses in school.

5. *Appreciation.* Experiences leading to the development of a background which permits understanding and response to such problems as appropriateness of material to use, quality of workmanship, good design, taste, function, and so forth.

6. *Leisure-time Interests.* To develop within the student an awareness of the variety of tasks performed in our industrial environment, and the interesting possibilities for self and material development by encouraging the student to continue with some form of this activity as a hobby.

7. *Vocational Guidance.* A program of study, visual aids, and field trips to various industries, in addition to developmental experiences affording opportunities to discover individual aptitudes, abilities, and interests.

8. *"Handy-Man" Activities.* To develop household mechanics or handy-man abilities through dexterity in the use of tools, materials, and in ordinary repairs to household equipment.

9. *Planning.* The development of a habit of orderly, systematic procedure or abilities which assist in the intelligent planning of any task.

10. *Desirable Habits and Attitudes.* The development of desirable personal and socializing values through participation in a laboratory or shop-type personnel organization where desirable work habits, attitudes, and social relations are a direct outcome.

11. *Pride and Interest in Accomplishments.* To develop in each individual an attitude of pride and interest in his ability to do useful things, and a personal responsibility for property and its care.

12. *Prevocational Purposes.* Where a sampling of industrial training is undertaken in advanced school courses with the intention of acquiring further training within a specific vocation.

13. *Social-Economic Co-operation.* To inculcate each individual with a knowledge and realization of the interdependence of people, of the need and value of social harmony and co-operation through group activities, projects, and studies.

14. *Self-Expression and Problem-Solving Attitudes.* The stimulation of creative self-expression and problem-solving attitudes through encouragement and opportunities to plan and construct useful articles in suitable materials.

15. *Vitalization of Academic Subjects.* To unify learning and integrate education by enriching the academic subjects and by bringing theory and practice closer together with illustrations and applications of all learning activities through the use of creative work in the shop.

The classification of these objectives as to their relative importance by selected industrial-arts instructors in the secondary schools of the North Central Association is shown in Table I.

A degree of prominence was shown many of the industrial-arts objectives in the section on objectives "of major importance," as 45 per cent of the shop instructors' emphasis was placed in this section.

The objective receiving the highest frequency of mention score in this section was "Pride and Interest in Accomplishments." It is interesting to note that this was the only objective not mentioned by the industrial-arts instructors as being "of no importance." Column 2 of Table I shows the objective receiving the second highest classification to be "Desirable Habits and Attitudes," followed by "Planning," "Exploratory Opportunities," and "Skills and Techniques." This completed the group on which industrial-arts instructors were in agreement, as the sixth ranking objective was 41 points below number five.

Objectives "of importance" received approximately 40 per cent of the shop instructors' influence. A significant shift in emphasis was noted when the fifteenth and twelfth objectives in column two (objectives "of major importance"), Table I, placed first and second respectively in this section. This indicates that close agreement was reached among shop instructors at this point where major emphasis was placed on these two objectives as being "of importance" rather than "of major importance."

The tendency for shop instructors to be more general in their agreement on objectives "of importance" was indicated when the top ten industrial-arts objectives in this section were linked rather closely together. This indicates that industrial-arts instructors were not in complete agreement as to their choice here, but considered a goodly number of the objectives to be "of importance" in the shop program.

The scores, or negatively the lack of

TABLE I. The Final List of General Industrial-Arts Objectives as Reported by 274 Shop Instructors in the North Central Association, 1946

Objectives	Of major importance		Of importance		Of little importance		Of no importance	
	Rank	Frequency	Rank	Frequency	Rank	Frequency	Rank	Frequency
1	2		3		4		5	
1. Knowledge of industrial procedures	8	118	7	121	8	31	10.5	4
2. Consumer knowledge or related information	9	108	4	126	6.5	32	6.5	8
3. Skills and techniques	5	173	11	88	15	11	13.5	2
4. Exploratory opportunities	4	174	12	82	11	15	12	3
5. Appreciation	6	132	5	124	13.5	13	9	5
6. Leisure time interests	12	82	2	135	4	50	8	7
7. Vocational guidance	7	127	10	111	9	27	5	9
8. "Handy-man" activities	15	55	1	138	1	70	3.5	11
9. Planning	3	176	13	81	13.5	13	10.5	4
10. Desirable habits and attitudes	2	178	14.5	73	10	21	13.5	2
11. Pride and interest accomplishments	1	187	14.5	73	12	14	15	0
12. Prevocational purposes	14	79	8	119	3	60	1	16
13. Social-economic co-operation	13	81	9	116	2	66	3.5	11
14. Self-expression and problem-solving attitudes	10	106	3	128	6.5	32	6.5	8
15. Vitalization of academic subjects	11	91	6	122	5	49	2	12

scores in the section on objectives "of little importance," shows conclusively that the industrial-arts objectives receiving the highest rating from prewar industrial-arts sources have not shifted radically in degree "of importance," although Table I shows that some of the objectives in the prewar list have changed their relative position.

Industrial-arts instructors with few exceptions believed the majority of the industrial-arts objectives considered here to be either "of major importance" or "of importance," for little more than 12 per cent of the instructors' emphases placed the objectives in the "of little importance" section. There was no agreement as to any one objective or group of objectives that should be considered "of little importance."

Little importance should be attached to the section on objectives "of no importance," as only 2½ per cent of the industrial-arts instructors contributing to this study believed some of the objectives listed in the questionnaire to be "of no importance." It is, however, interesting to note the results, and they are presented in column five of Table I.

Honor in the School Shop

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Honor is a good word, but its connotation is somewhat elusive; it is something very individual and exceedingly personal. Nevertheless, boys are often fond of using the term *honor*. If a request has been made in an appropriate manner, the boys are proud to think that they are controlled by motives of honor.

A number of years back the writer's school shop was troubled with the usual stealing called "swiping" or "hooking"; it had, in defiance of an elaborate system of locks and checks, become an unceasing and persistent nuisance. The irritation and annoyance which developed, occasioned an extremely unwholesome atmosphere. Small tools, items of supplies, and even parts of tools or machines were never safe. The boys appropriated pieces of one another's projects rather than make the pieces themselves.

Inaugurating an Honor System

At the beginning of a new semester the writer presented the results of his observations to one of the classes composed of older and more experienced boys. These boys were all interested in industrial work of various sorts, and most of them expected to be in the shop the following year. The instructor assured them of his faith in them and acknowledged their ability to deal with the troublesome problem.

The attention of the boys was called to the fact that if money must be used for new tools to replace stolen tools or broken tools, that the money could not be had for additional machines which the shop needed, and which the boys were eager to get.

This meeting was manipulated in such a way that freedom of discussion was induced. The boys were encouraged to frankness and directness. The outcome of the discussion was the development of a great deal of earnest enthusiasm and agitation in regard to an *honor system*. A committee of boys was selected by the group, with the guidance of the instructor, to set in motion a workable system. A rather modest program was presented at the next class session. The proposal was a combination of a few simple but inclusive rules and an established directing committee.

Under the scheme which evolved, the guiding committee had complete responsibility in matters concerning the use of equipment and supplies and enforcement of the rules. By the direction of the committee other boys were appointed to handle the necessary details of checking. These checkers were understood not to be vigilantes of the equipment and supplies, but were simply to help maintain the equipment and supplies in proper order.

Every approach was made from the point of view of shop efficiency. This, it was explained to the boys, would lessen waste of time for them. Any lock placed on cupboards or cabinets or any checking system put into operation was interpreted as an arrangement for order or efficiency. Checkers took pride in their positions and were careful that all articles of equipment were kept in place. A sufficient number of checkers was used so that the responsibilities of each individual were few, and were cared for thoroughly.

Results Achieved

The performance of the plan was quite gratifying and the petty thievery was reduced to an inconsequential minimum. The leaders asked for occasional advice, but on the whole matters were handled with punctuality and dispatch. The boys quickly grasped the essence of the undertaking and loyalty to the *group* seemed to take the place of loyalty to the *gang*.

This venture was, in reality, an experiment in democratic procedure. From a superficial viewpoint an endeavor of this nature might appear to be a waste of time and effort, but in reality the result makes for economy because of added interest and incidental learning. There was a decided growth in democratic procedure involved in this application of social ethics.

If in the presentation of the plan the word democracy is used, then democracy may come to have a new meaning for the boy, and if the present social way of life is to continue it must be practiced in the schools to the degree of habit. It is no wonder that there exists many undercurrents of dissatisfaction when many of the classrooms are handled with a democratic despotism that is ignominious.

The success of this experiment bears out the fact that the important thing in dealing with boys of adolescent age is to have faith in their ability and good intentions. It is better to put credence in their honesty, and the boys will respond with a surprising trustworthiness. The truly democratic classroom procedure in the schools of today will tend to minimize the dread of responsibility among future workers. This dread of responsibility is remarkably prevalent among present skilled workmen. The trend will be in the direction of a free mechanical culture and a truer industrial democracy where all share the responsibilities.

Stay With Your Students

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When the shop instructor's interest is directed from his class, either of his own accord or through the influence of others, both he and his students will lose as a result of it. Only in case of urgent need should he leave the shop. Social calls are to be frowned upon. There is nothing wrong in keeping shop records during the class period when it is done at an appropriate time and class activities are not neglected. Construction of sample projects by the instructor is to be encouraged but not during class time, except when giving demonstrations. The role of the school fix-it-man can become very vicious if the instructor is not careful. School repairs and odd jobs done by the industrial department are justified from the educational standpoint only when they are integrated into the course and contribute to the development of the students.

Unreasonable Demands

Some school administrators have been known to be too demanding of assistance from the industrial department, especially in contributing behind the scene to the success of school programs. For example, construction of stage equipment and exhibit booths has been the source of many woodwork instructor's headaches. This is unfortunate, particularly when the students are not far enough advanced and the instructor is forced to do the major part of the work in addition to his teaching. Extra work performed by the instructor means less time devoted to his students. The complexity of the work carried on in the shop warrants the instructor's maximum attention. The industrial department should contribute liberally toward the success of school projects, but care must be taken that the contributions do not reach a point of diminishing returns insofar as benefit to the students is concerned. There is some merit in having students work on projects on their own initiative. It helps develop the ability to work without supervision which is the way much of their work will be carried out later in life. However, work requiring either the instructor or groups of students to spend time out of the shop seldom produces the best instructional results. The less mature the students, and the larger the classes, the less the students and instructor should be separated. Even the smoothest running foremanship system needs the instructor's guidance. It is the instructor's duty to discuss with his superiors the problems and probable results of extra work proposed for his department. He must bear in mind that instruction and student development comes first, production second. The objectives of the industrial department and its contribution to the general objectives of the school should be considered very carefully. Unfavorable outcomes as a result of the instructor's absence, or diverted attention while in the shop are considered in the following paragraphs. It will be seen that the favorable results of his presence and full-time attention are to be desired.

Results of the Teacher's Absence From His Shop

With little exception, discipline or order in the shop can be expected to decline during the instructor's absence. This may cause uncomplimentary repercussions throughout the school; thus casting a reflection upon the instructor. Accidents, poor work habits, quality and quantity of student work, waste of materials, equipment breakage, and lowered shop morale in general are closely related to discipline. Shop standards once allowed to drop are difficult to raise to the previous level.

Mere presence of the instructor in the shop is not sufficient. He should constantly be alert to the needs of the students, and exhibit by word and action his sincere interest in them. A class senses immediately the instructor's attitude and reacts accordingly. The shop teacher's enthusiasm can be tonic even to the less interested student. The instructor's job includes more than the teaching of skills, procedures, and orientation to industrial life; it embraces the development of such intangible things as character, attitudes, interests, appreciations, and work habits. These intangible items play the major part in many situations in the students' future life.

The instructor's work is bound to be more effective if he observes class activities closely by circulating among the students to see exactly how they are progressing. A few questions determine their understanding of the work. In such a manner the instructor guides, encourages, and assists his pupils, thus giving each student an opportunity to progress at his own rate to the

fullest extent. One of the advantages claimed by the industrial department is its ability to take care of individual differences, but the instructor who spends most of his time at his desk or working on some odd job can hardly be expected to solve individual problems. In fact, the only problems he really knows about are those the students sense themselves and are willing to bring to his attention. Properly conducted, personal contact with the students is of inestimable value. Not only will the instructor be able to become acquainted with the student's problems in the shop, but also with his out-of-school problems, interests, hobbies, and educational vocational leanings.

It is through close supervision and guidance that the instructor can uphold high shop standards in student work and work habits, discipline, procedures, and housekeeping. Such guidance keeps to a minimum the errors which so often lead to students' discouragement. Thus, the instructor will be in a position to check on conservation of materials, condition of tools and equipment, and student working conditions. He can more easily determine when reteaching or new demonstrations and technical information should be given. In addition, grading can be done more effectively when the instructor is constantly in contact with his class. So too may he more easily select and judge foremen, and determine what students are ready to work on machines and carry on other types of advanced activity. The instructor's obligation to contribute his utmost toward student development can be accomplished to a higher degree of personal and professional satisfaction when he stays with his students.

The Induction of New Teachers

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How do you induct new teachers into your school system? Have you a definite program of induction or do you just casually introduce your new teachers to their co-workers and let it go at that? Your induction technique or the lack of it, like the proverbial *first impression* is a lasting impression which may mean the difference between the development of a good teacher or a poor one.

Whether a teacher coming into a new teaching situation is experienced or inexperienced, there are certain points about each school system which are different and which should be made known to the teacher as quickly as possible.

It is particularly important that we in vocational education have an effective and efficient program of induction for new teachers because it is often necessary for us to draw skilled craftsmen and technicians from industry who have had a minimum of teacher training and who are generally lacking in their knowledge of school procedures and educational organization. Such craftsmen and technicians from industry know their subject matter, and they may even have a natural ability to teach, yet they are often at a loss when it comes to thinking in educational terms and working efficiently in a school situation. For such teachers, a well-planned induction program provides a sound foundation upon which an in-service training program may be built. It also provides sufficient background for the new vocational teacher so that he may *hold his own* or at least listen intelligently in informal and formal educational discussions. The new vocational teacher in his contacts with the lay public will be able to talk more intelligently concerning his job as an educator and the aims and objectives of his particular school system if he has received a properly planned induction program.

Orientation Course

The following course was prepared by the author and is used in his school system to orient the new teachers. The program is divided into six sessions and requires about 15 hours to complete. It is preferable to give the course before the teachers start teaching; however, if this is impossible the sessions are held after school during the first month of school. Refreshments are served, and the teachers enjoy a short period of relaxation and informality before each session. An informal conference method of instruction is used, and various members of the administrative and supervisory staff are assigned responsibility for specific sessions. The teachers are encouraged to ask questions and to discuss the pros and cons of any of the topics presented.

At first glance, the outline may give one the impression that such general topics are complete courses in themselves and they could not be covered in such a short period of time. This is, of course, true, but the purpose is not to provide a comprehensive program of detailed instruction but rather to provide an overall picture — a vantage point — a general appreciation of vocational education and the aims and objectives of the local vocational school system as they relate to the total educational scheme.

MIDDLESEX COUNTY VOCATIONAL SCHOOLS
Vocational School Teacher Orientation Course

Session One

A. Historical roots of vocational education
B. Development of vocational education in the United States
   1. Economic and social forces and factors which influence need for vocational education
   2. Vocational education defined
   3. Brief statement concerning underlying philosophy of vocational education
C. Types of programs, their objectives and relationships
   a) Unit trade
   b) Apprentice
   c) Home economics
   d) Part-time cooperative
   e) Evening trade
   f) Extension
   g) Agricultural and industrial
   h) Distributive education

Session Two

A. Development of vocational education in New Jersey
B. State department of education
   1. Organization
C. Organization of the vocational division
   1. Staff members, their functions and duties
   2. Lines of authority
D. Development of vocational education in Middlesex County
   1. Description of various programs, their organization and objectives
   2. The veteran, where and how he fits into our programs

Session Three

A. Our administrative and supervisory organization
   1. Lines of authority
   2. Duties and functions
B. Explanation of the contract and its provisions
C. Teacher rating
   1. Why
   2. How
D. Sick leave
E. Pension fund

Sessions Four and Five

A. Teacher responsibilities
- 1. Certification
  - *a*) Types
  - *b*) Qualifications
  - *c*) Methods of renewal
- 2. Professional improvement
  - *a*) State department courses
  - *b*) College courses
  - *c*) Local system courses
  - *d*) Industrial visits and summer work
  - *e*) Professional reading
- 3. Records
  - *a*) State registers
  - *b*) Requisitions
  - *c*) Inventory
  - *d*) Permanent pupil records
  - *e*) Checking level-marking sheets
  - *f*) Absence, tardy, leave of absence slips
  - *g*) Progress charts
  - *h*) Accident reports and safety
- 4. Human relations
  - *a*) Principal-teacher
  - *b*) Teacher-public
  - *c*) Teacher-pupil
- 5. Good housekeeping
  - *a*) Tools, equipment, closets, desks, storeroom, tool cribs
  - *b*) Class and shop routine
  - *c*) Ventilation
  - *d*) Light
- 6. Preparation of instructional materials
  - *a*) Job analysis
  - *b*) Course outlines
  - *c*) Instruction sheets
- 7. Professional organizations
  - *a*) Values, functions, cost
  - *b*) A.V.A., N.J.V.A., N.E.A., N.J.E.A., M.C.T.A., M.C.V.T.A.

Session Six

A. Techniques of vocational teaching
- 1. The vocational pupil
- 2. The vocational class
  - *a*) Heterogeneous vs. homogeneous grouping
- 3. Suggested teaching methods to meet problem of ungraded classes
- 4. Discipline
  - *a*) Internal vs. external
  - *b*) Suggested methods for developing internal discipline
- 5. Development of good work habits and attitudes
  - *a*) Why
  - *b*) How
- 6. Teaching aids
  - *a*) Instruction sheets
  - *b*) Film strips
  - *c*) Slides
  - *d*) Films
  - *e*) Charts
  - *f*) Models
  - *g*) Demonstrations
  - *h*) Trade journals
- 7. Annotated vocational bibliography

Conclusions

Just as industry has learned the importance of having a well-planned induction technique, so the school administrator will find that the time spent in developing and utilizing a well-planned induction procedure to adjust his teachers to their total teaching situation is essential and important because:

1. It will make for more efficient teaching.
2. It has a morale building effect which helps to raise the total *esprit de corp.*
3. It will tend to prevent unnecessary time-consuming problems from arising.
4. It will materially assist in making more efficient administration and supervision possible.
5. It will acquaint the teachers with the administrative and supervisory staff in a manner which should provide a foundation for democratic co-operative relationships.

Outline of Related Subjects For Auto Mechanics

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(*Continued from page 232 of the June, 1947, issue*)

8. What do the piston rings accomplish?

a) *Cut*: The piston rings are not complete circles, but are cut at one point so that their diameter may be expanded or reduced.

b) *Spring type metal*: They are made of metal that will flex or bend as a spring. This allows them to be expanded to be passed over the full diameter of the piston and dropped into slots in the surface of the piston.

c) *Contracted in the cylinder:* Their normal or released diameter is greater than the cylinder diameter or bore and after they are installed on the piston they must be compressed to be placed in the cylinder. In the cylinder they expand outward against the walls with a steady even pressure at all points around the walls and with a film of oil retain compression.

9. What are the valves and their duties?

a) *To open and close ports*: Valves serve to open and close the inlet and outlet ports or openings in the combustion chamber when the engine needs (1) a charge of vaporized gas and air sucked through the inlet connection; (2) to expel or exhaust the burnt gas through the outlet.

b) *Shape and face*: They are mushroom shaped. The disk closes the opening. The rim of the disk is beveled and must fit accurately into the seat of the port.

c) *Stem and guides*: The long slim stem moves in a guide hole and serves to raise the head and to keep it in alignment with its seat. The camshaft underneath the stems raises and lowers them at the proper time.

10. What are the three main groups of moving parts?

a) The power assembly including the pistons, the connecting rod, and the crankshaft.

b) The gas flow controlling parts which are the valves and camshaft.

c) The ignition assembly including the distributor shaft, the cam, and rotor.

d) *Comparative speeds*: These shafts are connected and turn in co-ordinated measure. The camshaft and distributor shaft each makes one revolution while the crankshaft makes two.

e) *Inter connections*: The means of connecting them is gears or chains and this allows a great number of possible connections. Only one connection, however, will give the correct relationship of actions in the three groups.

11. What is timing and how is it accomplished?

a) *Comparison of shaft's movements*: Timing is the setting or checking of all of the parts of the engine to see that the actions or movements of the various parts are in agreement with that of the others.

b) *Actions occurring simultaneously*: Actions or positions of each that occur simultaneously are separately established and without moving them the connections are made. Actions that occur together are: (1)piston at top dead center; (2) its exhaust valve just closing and inlet just

starting to open; (3) a high point of the distributor cam just touching the bumper block and opening the points. This is a general rule — always consult specifications on actual job.

12. How are valves held on their seats and in the block guides?

a) *Details of assembly*: Valves are held by heavy cylindrical coiled springs that surround the valve stem. The end of the spring nearest the head seats against the block around the end of the guide. The other end seats in a cup shaped washer that in turn rests on small retainers gripping the end of the stem.

b) *Springs' duties:* The spring must be compressed and shortened considerably to allow the washer to rise high enough on the stem to permit insertion of the retainers. Therefore, the spring when assembled is always compressed and holds the valve firmly on its seat until pushed open by the cam.

13. What are the common valve troubles?

a) Burning or warping by heat.

b) Carbon on seat or stems.

c) Wear in guides and on stems.

14. What are remedies?

a) Removing all carbon.

b) Valves are usually lightly refaced on grinder (see *Black & Decker manual*).

c) Seats if pitted or out of round also reground.

d) If not eroded or out of round, faces and seats may be restored to an airtight fit by "hand lapping" with valve grinding compound.

15. What is valve clearance?

When the valve is on its seat and performing its function of retaining the compression, there should be a small space or clearance between the end of the valve stem and its lifter.

16. What is its purpose?

The valve stem's length varies considerably with its temperature changes, and the clearance permits such expansion without holding the valve off its seat.

17. How is the clearance adjusted?

a) *Adjusting screw*: On most engines an adjusting screw with hexagon head threads into a hole in the top of the lifter.

b) *Jam nut*: Usually a hex jam nut on the adjusting screw is tightened against the lifter's top to preserve the adjustment.

c) *Procedure*: One open end wrench holds screw. One open end wrench holds lifter. One open end wrench loosens jam nut. One feeler gauge checks the necessary adjustment. After correct adjustment retighten jam nut.

Ignition — Electrical

1. What ignites the charge?

Current jumping the air gap of the plug produces the igniting spark.

2. What type of current will jump the gap?

It requires a special high pressure current produced in a coil or transformer.

3. What is necessary in handling this current?

Because it is a jumping, high pressure current, the wire carrying the current must be heavily insulated to restrain it from jumping or *shorting* to the metal before it reaches the plug. Many cases of missing and failure of engine to start are due to the current's leaving its circuit. Moisture and cracked insulation are the chief causes.

4. What is in the secondary circuit?

It starts in the (*a*) *coil*, is taken to the (*b*) *distributor cap* and the (*c*) *rotor*, then to the (*d*) *plugs*.

5. What is the primary circuit?

a) *The battery:* Produces and sends the low pressure current to the metal screw post that is the beginning of the

b) *Primary winding*: in the coil. The other end of the primary winding is a metal screw post and from that a conductor leads to the insulated entrance on the side of the

c) *Distributor*: Inside the distributor it travels through the movable, insulated arm and when they are closed, through the

d) *Points*: One point is grounded and the current returns to the battery by the

e) *Ground.*

6. What is the condenser?

a) *Connections*: The *condenser*, with one insulated pigtail connection, fits in or on the distributor. The insulated connection attaches to the insulated entrance on the distributor's side. The metal case is screwed or grounded to the metal of the distributor. Any condenser can be used with a distributor.

b) *Action*: It absorbs the excess primary current when the points open and reduces arcing and burning. Some spark will occur if the system is normal and will tell if the primary circuit is complete.

c) *Backfire*: The current going into it is immediately kicked backward through the coil's primary winding and intensifies the secondary current and spark.

7. What does the coil do?

It contains two windings, the primary and the secondary. The primary receives the 6 volt low pressure battery current and when the points break a magnetic action occurs that instantaneously produces in the *secondary winding* the high voltage (5000 v. to 20,000 v.) current that can jump the plug's air gap.

8. What are the points?

a) *Switch*: An electrical switch with special metal contact surfaces that interrupts or stops the battery current.

b) *Operated by cam*: The opening action of the points produces the spark and is caused by the high sections of the distributor shaft cam.

c) *Action must be "timed"*: These are often called timer points because that action must occur when the piston is near top dead center at the end of the compression stroke.

9. What distributes the sparks to the proper cylinders?

a) *Distributor cap*: The *distributor cap* has a central inlet tower receiving all the sparks from the coil. Around the outer circle of the cap, on its top, is a row of towers one for and connected to each cylinder.

b) *Rotor*: The entering sparks go to the hub of the conductor on the rotor, which is held on top of the distributor shaft and circles under the cap. The outer end of the rotor contacts the circular row of tower terminals and delivers to each a spark when it is needed at that cylinder.

10. What are the parts of an electric force?

Electricity is a team composed of

a) *Amperage:* Amperage is the volume or quantity of the force moving through the *conductor*. It actually does the work and is measured by an *ammeter*.

b) *Voltage*: Voltage is the pressure that pushes the current around the circuit and is measured by the *voltmeter*. This is the most common measurement.

11. How are voltages and amperages combined?

In a variety of ways. There can be a large current and low voltage as the starting motor's supply which is about 5 volts and from 175 to 200 amperes, or the ignition current, 5000 to 20,000 volts and 1/1000 ampere or less.

12. What is polarity?

Polarity means the direction of current flow in the circuits and depends on the *battery's* connections. All current is forced out of the big or circuit battery post and returns through the small or — post.

13. What is a circuit?

A continuous unbroken connector from the delivery terminal of a producer to its negative or receiving post. It consists of four main sections: (1) the producer, (2) the plus (+) or *delivery conduction line*, (3) the operated unit, (4) the minus (—) or *return conducting line*.

14. What compose the conducting sections of an automobile circuit?

a) Insulated wire, one line from producers to units.

b) The *ground*, which is the metal of the engine frame or body, forms the second connection.

15. Which is the delivery line?

Chevrolet connects the (+) post to the insulated line, which will deliver the current on that system. Ford and Chrysler cars ground the positive post and the current goes from the producers through the steel of the car end and returns over the insulated wire.

16. Why is polarity important?

If the battery is reversed, serious damage will result; also, meters have polarity, their + connections must be hooked to the *delivery line*.

17. What are the chief ignition difficulties?

a) Failure or undersupply of current.

b) Failure of the units.

18. What causes current failure?

a) *Discharged battery:* Test with hydrometer, 1175 minimum.

b) *Broken circuit:* (1) Snap the points, no sparks indicate no battery current. (2) Voltmeter's + line hooked to delivery side of points; — side to return path as close to points as possible; keep points open, no reading signifies no current.

c) *Burnt points:* Voltmeter as connected in 18, (*b*) 2, in the foregoing, points closed and current flowing, 1/10 volt or more reading indicates too much resistance.

d) *Shorts (accidental grounds)*: Located by voltmeter, no voltage at points when open, move the meter's lead that is attached to the insulated line back along that line until voltage registers. This locates the *ground* or point at which the current detours.

19. What are the tests for faulty units?

Substitute units that are known to work correctly. Coils, batteries, condensers are interchangeable. If a change improves the spark, there is some fault in the original part.

20. What is the quickest general test?

If an engine fails to start the general condition of the producing units can be checked by the *overall test.*

Procedure:

a) Remove the coil's wire from the center well of the cap and remove cap.

b) See that points are closed and switch on.

c) Hold the free end of the coil's high tension wire about ⅜ in. from metal ground.

d) Carefully touch the end of the point arm with the finger and push the points apart. A snapping spark should jump from the coil's wire. A snapping, bluish-red spark at least ¼ in. in length should jump at every separation of the points. Shorter length or erratic production indicates trouble in the system.

21. How are the distributing parts tested?

Visually in most cases. If the high tension current has been shorting in the cap or rotor, it will burn black scraggly lines, that are readily discernible, in the surface of the bakelite.

Lubrication

1. What are engine points where lubrication is vital?

a) Pistons, rings, wrist pins, and walls.

b) All crankshaft bearings, connecting rod, and main bearings.

c) Camshaft bearings and valve stems.

d) Timing gears.

2. How is oil supplied to pistons and rings?

A heavy oil vapor throughout the interior of the engine deposits a film on the cylinder walls when the piston is up. As they descend the oil spreads around the rings.

3. How is the vapor or splash created?

The swinging crank arms of the crankshaft, by centrifugal force, sling oil with great pressure against all parts of the interior causing the vapor.

4. How is oil supplied to the crankshaft?

a) *Pressure system, hollow crankshaft:* In pressure systems, oil is pumped into the shaft at the main bearings. Drilled passages in the shaft lead to the crankpins and supply the connecting rod bearings. A certain amount of this oil is pushed through and out of the bearings and by centrifugal force becomes the spray.

b) *Spoons and troughs:* Another system uses dippers or spoons on the lower side of its connecting rod bearings. At the proper position underneath each piston and connecting rod is a trough supplied by a pump with oil. The dipper at the lower side of its swing smacks and "splashes" this oil. Some of the displaced oil goes upward into the connecting rod bearing, the rest becomes heavy vapor.

5. What are main oiling troubles?

a) Insufficiency caused by pump failure or line stoppage.

b) Oversupply causing oil burning in the combustion chamber.

6. What causes "oil burning"?

a) *Faulty rings:* Ineffective rings do not pull the oil deposited on the walls down with the piston and what remains on the walls is burned on the power stroke.

b) *Connecting rod bearings:* On pressure systems loose connecting rod bearings allow excessive leakage. This throws so much oil on the walls that the rings, regardless of condition, cannot scrape it down.

c) *Valve stem clearance:* By excessive looseness between the inlet valve's stem and the guide, oil intended to lubricate the stem is sucked up by the vacuum created on the inlet stroke.

7. What is chassis lubrication?

Rubbing and friction points at spring ends, drive shaft, steering linkage and gearbox, generator, starter, distributor, fan, transmission, differential, brake and clutch operating mechanism, rear wheel bearings and other points need grease or oil.

8. How is grease applied?

a) *Alemite fittings:* Small fittings to which the hand or air gun can be attached, allow the lubrication to be forced between the rubbing surfaces.

b) *Quantity:* Enough should be applied to thoroughly fill the included space and be evident at the joints.

c) *Consult specifications:* Always consult the chart to know all points and quality and quantity of lubricant needed.

9. How are guns filled?

a) With hand gun the end is unscrewed and the cylinder filled about ¾ full with clean grease.

b) The air gun has an aluminum cylinder that unscrews from the gun body. Inside this cylinder is another that is to be filled and correctly replaced. Don't let any part of the aluminum gun fall or it will break.

The operator should use the correct type of grease and only that which has been stored in a tight container and is perfectly clean. He should co-operate in keeping the supply from becoming contaminated.

TRADE SPELLING

Terms Used in Woodwork and Carpentry

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There are many words and terms used in any trade that are not commonly used by people in general. Many words are used differently in the trades than they are in general.

The following list of words are those commonly used in the woodworking shop and in general carpentry. They are listed with the idea of teaching them to the shop boys, both on the job and in classes. The latter may be done by taking five or ten minutes per day, giving the meaning of each word and term with an understanding as to when and where they are to be used. Arrangements may be made with the English teacher to work with these boys, either in the regular English class, or in a special group.

All words that are misspelled should be added to the list of spelling words until each student has correctly spelled all the words.

The class may have spelling once or twice per week. In that case 15 or 20 words may be given. There should be the same number of new words each day. The pupils should be able to make a practical application of all words learned.

The words are listed alphabetically, but should be selected and arranged as they are related to the lesson or job being taught. It is much easier to remember a term and its meaning will be emphasized if the study is made as it fits in, and ties up with the job.

The teacher should check for proper spelling and use of words in checking out tools and materials to pupils. He will give practice in using proper terms in the description and specification of jobs. Each pupil should be required to write out a description of each job. Substitute words should not be allowed.

Be sure that each pupil understands the meaning and use of all words listed for study. Get them in the habit of using the dictionary, and that they practice using the proper terms at all times.

A dictionary on technical terms should be kept in the shop or available at all times. The correct definition for most of the following words will be found in any dictionary of technical terms.

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TRADE TERMS
Carpentry and Woodwork

A

abacus, abrasion, abrasive, absolute, accurate, adherence, adhesive, adjustment, adz, aggregate, air-slaked, aisle, alabaster, alcove, analysis, angle, angle bead, angle bracket, angle iron, annual ring, approximately, arch, architrave, arris, artisan, asbestos, asbestos shingles, astragal, attic, auger, auger bit, automatic, awl, axes, axle

B

backband, backing, backsaw, balance, balcony, balk, balloon framing, baluster, balustrade, band, banister, bar clamp, bargeboard, base line, base molding, baseboard, basil, basswood, batten, batten door, bead, bead plane, beam, bearing, bed molding, beech, bench dog, bench hook, bench plane, bench stop, bench vise, benchwork, bend, bevel, bisect, bit brace, bit gauge, black walnut, bleaching, bleeding, blending, blind, block plane, blueprint, board, boring, bore, board feet, board measure, bolster, box column, brace, break, buckled, builders' tape, building line, building paper, bull's-nose, bungalow, burl, bushing, butt hinge, butt joint

C

cabinet, caliper, calking, calking tool, cant, capitol, capping, carcase, carpet strip, carriage, carving, casein, casing, cedar, ceiling, center punch, chamfer, charring, chisel, chuck, circle, clamp, clearance, cleat, clockwise, close fit, clustered, coat, code, coffer, cofferdam, cold chisel, collar, collar beam, colonial, colonnade, color, column, combination square, common brick, compass, compass saw, contour, contractor, convex, coopered joint, coped joint, coping, coping saw, cord, Corinthian order, corner bead, cornice, corona, corridor, corrosion, corrugated, costumer, counterbore, countersink, court, cove, cove molding, creosoting, cresting, cripple rafter, crosscut saw, crotch, crowbar, crown, crown molding, curtain wall, curve, cylinder

D

dado, dead level, deal, deeping, depth gauge, derrick, design, designer, detail, determine, dimension, direction, dividers, dog, door check, doorframe, doorhead, doorstop, Doric frieze, Doric order, dormer window, double-hung window, double pitch, dovetail, dowel, downspout, draft stop, draftsman, drawer pull, drawer slip, drawknife, drill, drip mold, driving home, drop siding, dry rot, dwelling

E

Easel, eaves, echinus, edifice, efficiency, elliptical, elm, emery wheel, enamel, end-grain, end-lap joint, erecting, escutcheon, Essex board measure, expansion bit, expansion joint, exterior

F

façade, face, face mark, fascia, featheredge, fiberlic, figure, file, filter, Fink truss, firmer tools, flank, flashing, flaw, float, floor plan, flue, flush, flute, force fit, fore plane, foundation, foundation bolts, frame, framework, free end, frieze, furniture, furred, furring, furring strip

G

gable, gable molding, gable roof, gain, gallery, gambrel roof

(Continued on page 308)

Problems and Projects

LETTER HOLDER

HOMER C. ROSE
Alexandria, Va.

This project is interesting because of its simplicity and the relationship of the two scrolls. Very little material is used and only a few tool operations are necessary. Facilities must be available for sweat soldering the pieces together if the project is constructed as illustrated; however, the scrolls may be riveted to the base if desired.

BILL OF MATERIAL

1 pc. of 10-ga. 2½ by 5½-in. brass
2 pc. of 10-ga. ⅜ by 15 -in. brass
Solder

Suggested Procedure

1. Cut the base and the stock for the scrolls to size as indicated in the bill of material and in Figure 2.

2. Drawfile and round all edges, round corners slightly.

CAUTION: Protect metal with clean copper vise plates.

3. Polish all parts with very fine abrasive cloth.

4. Form the scrolls as in Figure 3. Shaping of the scrolls is the most difficult operation in this project and must be done with great care.

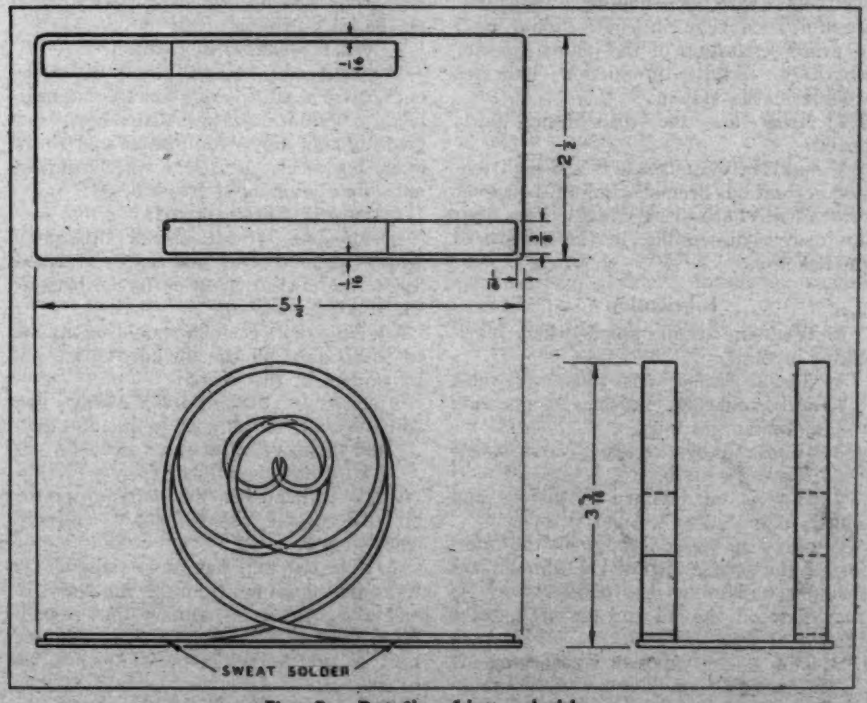


Fig. 2. Details of letter holder

Fig. 1. Letter holder

The inner part of the scroll should be formed first by bending it over a stake or a rod held in the vise. A mallet should be used on the extreme end but the remainder of the scroll should be bent with the hands and a bending fork. Care must be taken to prevent tool marks and to form the scroll to the exact shape desired. Practice on scrap stock is recommended.

5. Sweat solder the scrolls to the base.

The surface of the scroll that comes into contact with the base should be coated with a medium coat of solder. The areas of the base to which the scrolls will be soldered should be marked off and also coated with solder. Be careful not to flow the solder onto the exposed portion of the base. Place one of the scrolls in place with the base set firmly on a sheet of asbestos. The scroll should be held down with a metal rod approximately 24 in. long, to avoid burning the hand. Apply heat to the scroll with large soldering copper or torch until the solder melts. Hold the pieces together until the solder hardens. Clamp the first joint with a small *C* clamp to prevent its melting apart from the heat to be used in soldering the second joint. Solder the second scroll to the base.

6. Clean and lacquer the project.

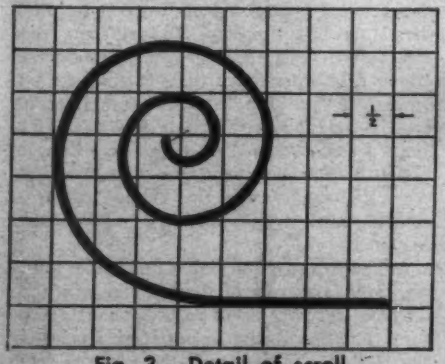


Fig. 3. Detail of scroll

Alternatives

The scrolls may be riveted to the base with roundhead rivets. The rivet holes in the base should be countersunk at the bottom.

The material for the scrolls may be square in cross section.

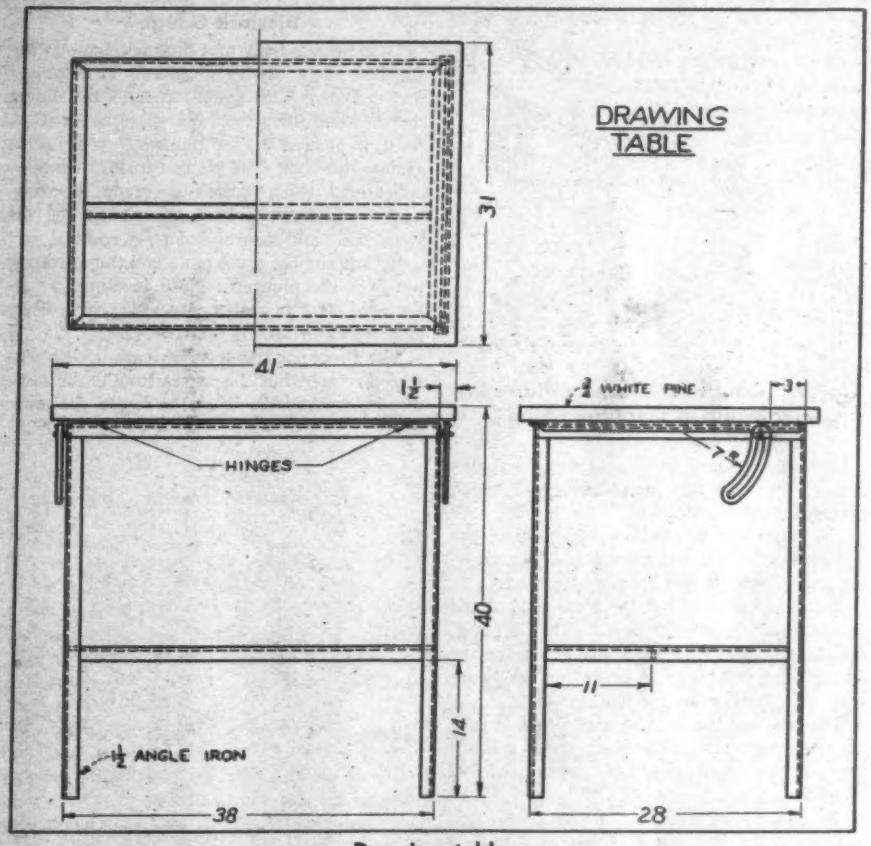
Felt may be glued to the base.

This project also may be made of iron with the surfaces planished.

DRAWING TABLE

DALTON R. LANDIS
High School
Coopersburg, Pa.

The drawing table shown herewith is constructed of 1½-in. angle iron. The top is made of ¾-in. white pine with all joints glued and doweled. The top is given four coats of shellac and one coat of wax as a final finish.



Drawing table

The table is provided with a tilting arrangement which consists of two metal arms that permit a maximum tilting height of 5 in.

The height of the table is such that it is comfortable for the pupil to stand while drawing, or he may sit on a 30-in. stool.

The metal frame is of welded construction.

GAUGES FOR GRADING WORK

T. F. REYNOLDS
Northeastern High School
Detroit, Mich.

During the war years when our schools were crowded with students, and undermanned with teachers, some means had to be devised so that teachers could give the most of their time to teaching and to individual supervision. To do this the teacher had to devise time saving methods for grading the shop classes.

In as much as we were preparing boys and girls to go into industry it was felt we might as well organize our classes along the line they would encounter when they leave school and compete in the world as it is.

In industry every article is inspected with gauges by people who are called inspectors. Inspectors must have gauges so we had the boys in the trade class make gauges.

A gauge, being an inanimate thing, shows no favors. Personalities do not enter into a grade. The gauge shows the job is either within limits or it is scrap. The boy sees it with his own eyes.

With large classes, ranging from 35 to 50 students, someone is always ready to have a job inspected. With gauges to grade the work it is possible to take a student from the class and appoint him as inspector for the day or week at the discretion of the teacher. As jobs are brought to this student he puts them into the gauge and gives the student the grade recorded on the gauge.

Following are some of the gauges used to mark the jobs:

In the machine shop the first turning job is a drill blank. As our shop courses are organized a boy is not just making exercises, but each job is usable in some completed project.

The so-called drill blank, for instance, may be used as a spindle in a small wood lathe we make in the shop, for a spindle in a small drill press, for the handle on the drill press, or as a drill blank. For a spindle the job must be accurate to size and no taper in it. For the drill press handle or for the drill blank, it need not be so accurate. If the blank is from .005 to .010 in. small, it is fluted and turned over to the bench-metal classes for practice drill grinding.

The gauge for checking this job is shown in Figure 1. This gauge checks the diameter and the taper, if any, in one place, and the length in the other.

Because the limits are so small on the drill blank the gauge was designed with a double arm. By keeping the actuating pins and the pivot points close together the pointer will move a considerable distance for each .005 in. of variation.

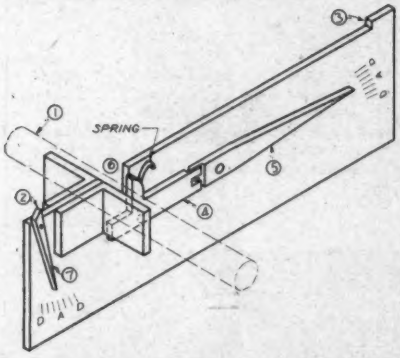


Fig. 1. Gauge for checking diameter and length of first turning job

Dropping the drill blank into slot 6 actuates arm 4, which in turn actuates arm 5 which then gives the grade.

The taper can be checked by dropping the end of the blank into the slot 6 and then drawing it through the slot from end to end.

To check the length of the blank it is placed in the space between 2 and 3. That actuates indicator 7, and that gives the grade for the length. The difference of grade for the diameter and length gives the final grade.

To solve our tool-post wrench problem each boy entering our machine shop has as a bench project the making of his own tool-post wrench.

To check the accuracy of the layout and workmanship, the gauge shown in Figure 2 was designed. One end of the wrench fits the screwhead in the toolholder and the other the screw in the tool post. Block 1 is the same size as the screw head in the tool-post holder and is in a fixed position. Block 2 is the same size as the screwhead in the tool post and works in an accurately machined slot in the base of the gauge. When the wrench is completed it is placed over blocks 1 and 2. This actuates indicator 5 and grades the accuracy of the layout and the marking of the holes.

As the recesses on the sides of the wrench are laid out and then machined on a shaper or milling machine, those also must be graded for accuracy. When the wrench rests on the

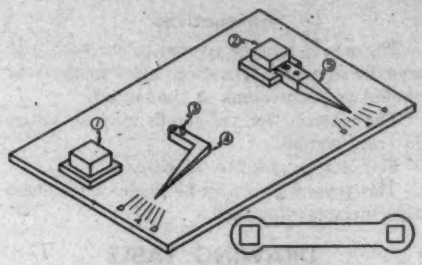


Fig. 2. Gauge for checking tool-post wrench

blocks 1 and 2, pin 3 on indicator 4 is pressed against the machined edge of the wrench. The indicator gives the grade. The wrench is then turned over, and the accuracy of the other side is indicated. The composite of all the grades gives the final grade for the project.

Diestock Gauge

To grade the body of a diestock made in the machine shop, the gauge shown in Figure 4 was designed. This gauge operates by sliding the diestock body into the space marked *X*. As it is pressed in, the plunger 1 is actuated against the body. The plunger in turn operates indicator 2 which records the grade. A spring, back of plunger 1, keeps it against the die stock body and insures a correct reading.

By keeping the pivot pin 2 and the operating pin 3 in the plunger 1 close together, a variance of .005 in. can be recorded if a fairly long indicator arm is used.

The foregoing gauge takes care of the outside diameter, but the recess for the die must also be checked. To check the recess, the gauge

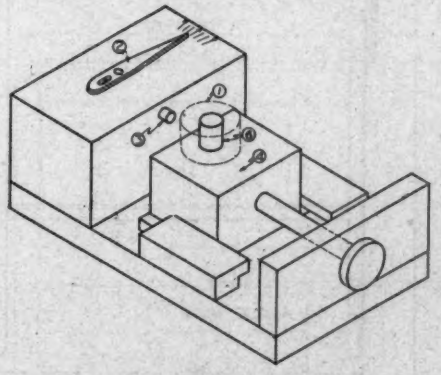


Fig. 3. Gauge for checking gear blank

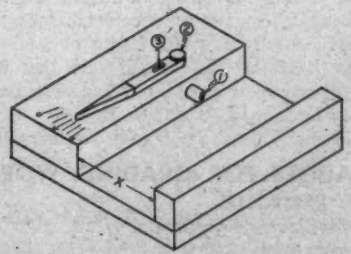


Fig. 4. Gauge for inspecting the diestock

shown in Figure 5 was made on the same principle. The body is made small enough to slide into the recess. As it is pressed into the recess the plunger 1 operates indicator 2 and grades the accuracy of the hole. The difference between the two grades as indicated by the gauges gives the grade for the whole job.

Gauge for Checking Gear Blank

Another job in bench metal is the problem of drilling and reaming a hole in the center of a cast-iron gear blank. To check the accuracy with which the hole is drilled a gauge was designed. This gauge is somewhat complicated, but nevertheless, simple to operate.

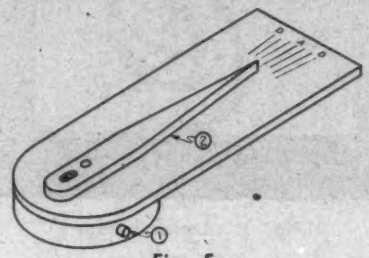


Fig. 5.

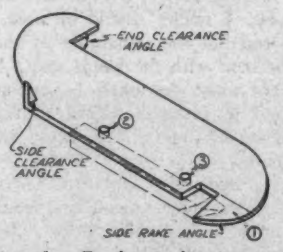


Fig. 6. Tool-grinding gauge

Place the drilled and reamed gear blank 1 over pin 6, shown in Figure 3, and adjust block 4 until it actuates plunger 3. Then revolve the gear blank until indicator 2 moves the farthest to the right. When that point has been found, again adjust block 4 until the indicator points to *A*. Now revolve the gear blank by hand until it has made a least a half turn. This operation measures the amount of eccentricity and gives the grade.

Of course, if the hole is exactly in the center the indicator remains at *A*.

Tool-Grinding Gauge

In the machine shop one of the hardest things to get young students to do is to grind their tool bits properly. To overcome this trouble we designed a gauge to check the grinding. In order to get them to grind the bit properly I have them grind the end clearance first. Grind and try until it fits the notch marked *end clearance* in the gauge shown in Figure 6. The next step is to grind the side clearance, again using the "grind and try" method until it fits the angle marked *side clearance*.

As the Armstrong patented toolholder automatically takes care of the top rake of a tool bit only *side rake* needs to be ground. Therefore, the side rake is the next face ground on the tool bit. Section 1 of the gauge is bent

down 12 to 15 degrees for the side clearance. To use the gauge the tool bit is held under the gauge as indicated by the dotted lines and the ground surface of the tool bit compared with the plane of the bent section 1.

At points 2 and 3, holes are drilled in the gauge and short pins pressed through to help hold the tool bit in line while the side-rake angle is being checked.

At first no attempt is made to teach the boys all the ways to grind tool bits for different types of cuts or for cutting different metals. Once they have mastered the grinding of tool bits for cutting one kind of metal they will switch to the others very readily.

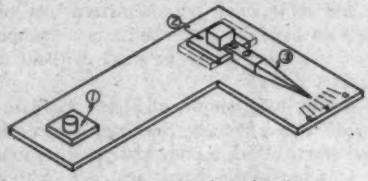


Fig. 7. Gauge for checking a crank arm

Gauge for Checking a Crank Arm

To check the crank arm of a hand grinder that we make in our advanced machine-shop course a gauge was designed that is practically the same as the one for checking the tool-post wrench. Pin 1, in Figure 7, is stationary, and pin 2 is movable in an accurately machined slot in the base. The pin at 1 fits the drilled hole where the handle will fit the crank. Pin 2 is square and just fits the squared hole in the crank.

When the holes of the crank are placed over the pins, pin 2 is actuated and indicator 3 grades the accuracy of the workmanship.

Checking Angles and Curves

One of the projects in our metal-fitting course is the making of a gauge to check the angle in the grinding of a drill point. The primary purpose of making the gauge is to teach the laying out of an object that has both straight and curved lines, then to saw and file to the lines. It also brings in the use of a protractor in laying out an angle.

To use the gauge, shown in Figure 8, the finished project is placed on the block 3, and the piece pressed against the indicator 1. As indicator 1 is pivoted on pin 2, the indicator will adjust itself to the angle cut on the

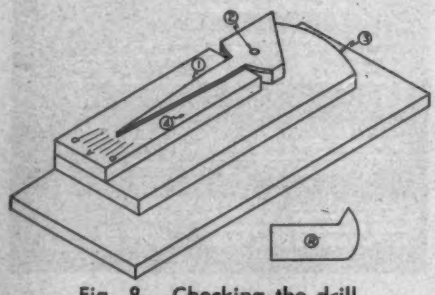


Fig. 8. Checking the drill post gauge

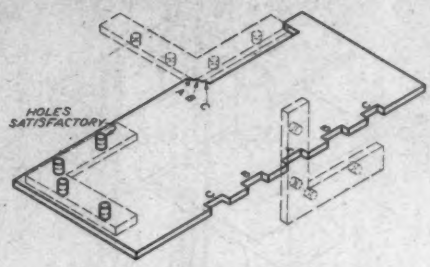


Fig. 9. Gauge for checking corner iron

project. Also, if properly made the curve on the gauge will fit arc 3.

As the angle is the important part of the gauge, it being used to fit the angle of the gauge, the indicator gives the grade of the project.

The job which is being checked is the one marked *R*.

Checking a Corner Angle Iron

Our bench-metal classes make a small corner angle. The stock for this project is cut from a

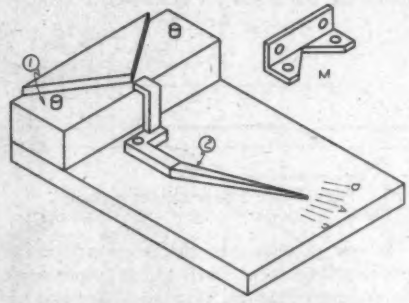


Fig. 10. Corner bracket gauge

piece of ⅛-in. thick cold rolled stock. Each side of the corner angle is 2 in. long and ½ in. wide. As it must be fastened down with screws, four holes must be drilled in it. The gauge in Figure 9 is used to check and grade the length and width of the sides and the location of the holes.

To make the gauge, a piece of steel ⅛ by 2 by 5 in., was used. On one edge five recesses were cut. The center one was cut exactly .500 in. wide. On each side of the .500 in. recess was cut another recess, one .510 in., and the other .490 in. The outside spaces are .520 in., and .480 in. If the corner angle fits into the middle or .500 in. space, it is given a grade of *A*. If it fits into either of the adjacent spaces a grade of *B* is given to the student. If it fits into either of the outside holes, he receives a grade of *C*.

On the opposite edge from the five spaces, there is another recess for checking the length of the legs. The depth of this recess is 3/8 in. On one end of the recess there are three steps. The largest one is exactly 2 in. The next step is 1.984 in., and the next or last is 1.968 in. The step into which the angle fits gives the grade of *A*, *B*, or *C*, respectively.

On one corner of the gauge four holes are drilled, and pins are pressed into them. When the holes are drilled in the corner angle they must fit over the pins to pass inspection. As holes are hard to drill exactly in place, without a jig or fixture to control the drill, the pins are slightly smaller than the holes to allow for the side travel of the drill while starting the hole.

Corner Bracket Gauge

To grade the accuracy of the angle and location of the holes of a corner bracket that is used to fasten teacher's desks or drafting tables to the floor another gauge was made. The bracket *M* is placed on block 1 in Figure 10, with the drilled holes placed over the pins, and the indicator brought up to the back of it. If the holes fit the pins and the notch is properly worked out, the indicator 2 will point to *A*. If the notch is not properly worked out a lesser grade will be indicated.

Drill-Grinding Gauge

One of our bench-metal jobs is the grinding of a twist drill by hand. The gauge shown in Figure 11 was made. For a drill to be properly ground, the cutting lips must form an angle of 118 degrees, and each lip must have a clearance of 12 degrees.

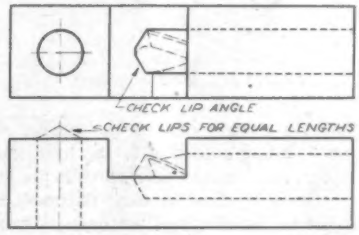


Fig. 11. Drill-grinding gauge

To make such a gauge, a properly ground drill was used to drill a hole into the end of a ¾-in. square piece of stock. Then at the bottom of the drilled hole a slot was milled in the square showing the end of the drilled hole. Because the cutting lips of the drill are not opposite each other, due to the web of the drill, the slot cannot be milled exactly 3/8 in. deep, but it should be milled just deep enough so that one lip of the drill, when in a horizontal position, is in the same plane as the cut surface.

After the milling operation is completed a properly ground drill is put in the drilled hole and revolved until the heel of the lip of the drill comes up to the milled surface. At that point a line is scribed on the cut surface. It shows the point at which the proper clearance should be.

The student grinds his drill and then tries it in the gauge. Each lip is tried separately by revolving the drill in the gauge.

If the angles are proper they will fit the bottom of the gauge. If one lip is longer than the other a space will be left between the lip and the properly ground hole. By revolving the drill the clearance can be checked as to whether it is too great or too little.

A Depth Gauge

In bench metal one of the first jobs is a chipping and filing job. A rough casting is first chipped and filed flat. That job is inspected

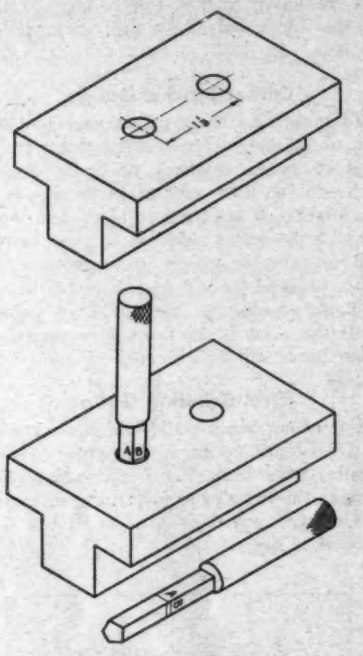


Fig. 12. Depth gauge

by placing a straight edge on the finished surface and grading according to the light showing under the straightedge. Having no light meter, that is a job of personal judgment and is subject to the effects of personal judgment.

However, after the surface has passed inspection and has been accepted, another job is performed on it. The chipped and filed surface is coated with layout ink, and the centers for two holes are layed out on it, to be drilled and tapped.

These two holes are to be drilled a definite depth and a definite distance apart.

First the depth of the hole is checked. They are checked with a gauge similar to a depth gauge but with five sides cut on it. See Figure 12. The end of the gauge is machined to 118 degrees so it will fit the bottom of the hole as the drill finishes it. On one of the flat sides of the gauge, a line is scribed to show the exact depth of the hole. Either above or below this line an *A* is stamped on the gauge to show the grade. On a side adjacent to the one marked *A*, two lines are marked, one 1/32 in. above, and one 1/32 in. below the one marked *A*.

This gives a plus or minus limit of 1/32 in., for a grade of *B*. On the side adjacent to *B* are marked two more lines each 1/32 in. farther apart than the *B*, and this is marked *C*. The operation is repeated until a grade of A, B, C, D, or E can be indicated by the gauge.

By dropping the gauge into the drilled hole and revolving it until a line on the gauge coincides with the surface of the block, the grade is ascertained.

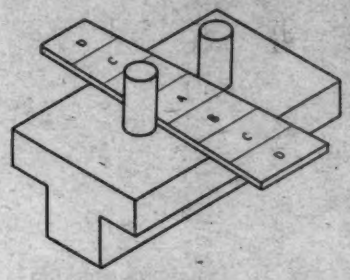


Fig. 13. Checking center distances

After the holes are drilled, they are tapped, and two studs are screwed into them. To check the center distance between the holes a tapered gauge is inserted between the studs. See Figure 13. The gauge is 6¾ in. long and 11/16 in. wide at one end and 13/16 in. at the other. In the middle is a place exactly ¾ in. wide. Three-eighths inches on each side of this place a line is scribed across the gauge. That gives a space of ¾ in. on the gauge. That indicates that the student should receive a grade of *A*. Either side of the space *A* is a ¾-in. space which will give the student a grade of *B*. The spaces are continued for grades C, D, and E.

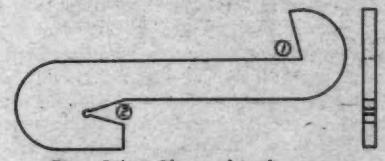


Fig. 14. Skew chisel gauge

In our pattern shop the boys had trouble grinding their skew chisels to the proper angle. To overcome this trouble we designed and had made in the machine shop, a gauge which the students could use when they were grinding their skew chisels. See Figure 14. The procedure was to grind angle 1 to the bias angle, and to grind angle 2 to the sides of the chisel. When grinding to the gauge, the students kept both sides of the chisel at the same angle.

INDIAN SILVERSMITHING

BEN HUNT
Hales Corners, Wis.

(Continued from page 250 of the June, 1947, issue)

Rings

A ring is a fine, one-evening project. Even a fairly complicated ring, including the setting of one or more stones, may be finished in that time. Before attempting any complicated work, however, it is well to try a few solid silver rings without settings.

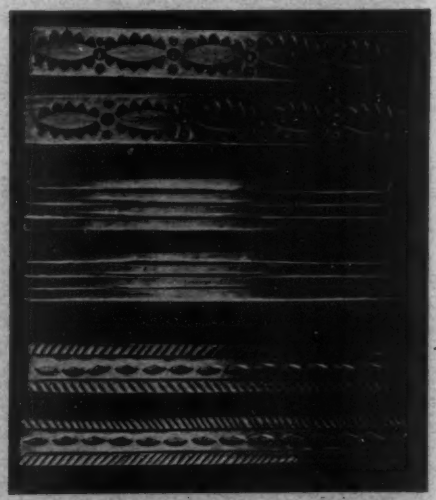
For a start, try a few "friendship rings." They are usually made in pairs, one for the girl and one for the boy friend. First, get the measurements of the fingers which the rings are to fit. Use a ⅛-in. strip of paper to get these measurements, or a ring that fits, or use a ring gauge. Cut strips of 18-ga. silver 5/16 in. wide and a little longer than is needed (1/16 in. longer is just about right).

Friendship rings

Before proceeding, it is well to study the design which has been chosen and see whether the required stamping punches are on hand. If not, they may be made without much trouble. It is well to keep several sizes of drill rod and some small ten- or fifteen-cent cold chisels on hand, so that when a new stamping punch is needed it can be made without unnecessary delay.

The ring band shown in Figure 1, Plate 9, is made with a straight liner and a small diamond stamp. With a pointed scriber scratch a line 1/16 or 3/32 in. from each edge. With the liner and a small hammer make the two long grooves along the scribed lines, and then stamp in the diagonal lines. These diagonal lines may also be made with a compound curved tool such as is shown at *e* in plate 4, page 81, February, 1947, issue of this magazine. It will be noticed that the edges of the ring band will bulge out where the stamp overlaps them. After the diagonal lines have been punched it is necessary to round or square off the edges with a file. The diamonds are punched as shown.

The design shown in Figure 2 is made with a curved saw-toothed stamp and two hollow-point nail sets. To find out how you will come out, take a piece of blotting paper, lay the silver blank on it, and trace around it with a pencil. Then you can press the stamp into the blotting paper, and you will know just what to do on the silver. Omit the nail-set punches at the ends until after the ring is soldered. Then it is put over the horn of the anvil, and



Ring blanks stamped and ready for soldering

RINGS

FIG. 1.

FIG. 2.

FIG. 3.

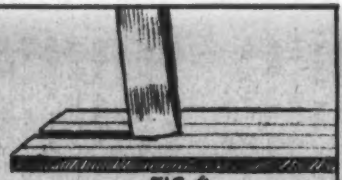


FIG. 4.

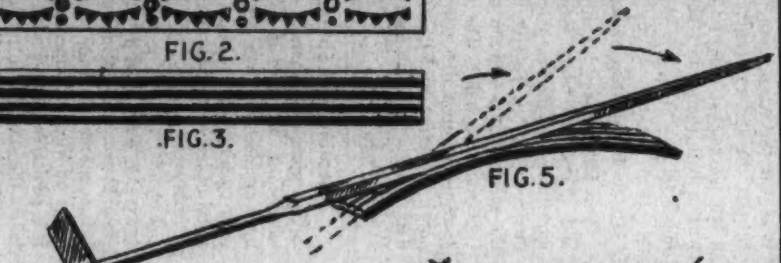


FIG. 5.

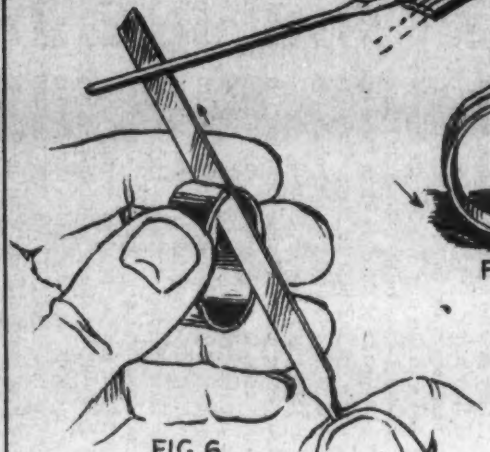


FIG. 6.

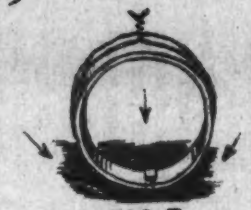


FIG. 7.

FIG. 8.

FIG. 9.

FIG. 10.

FIG. 15.

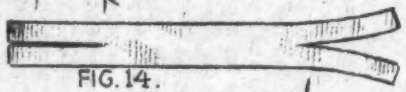


FIG. 14.

FIG. 11.

FIG. 16.

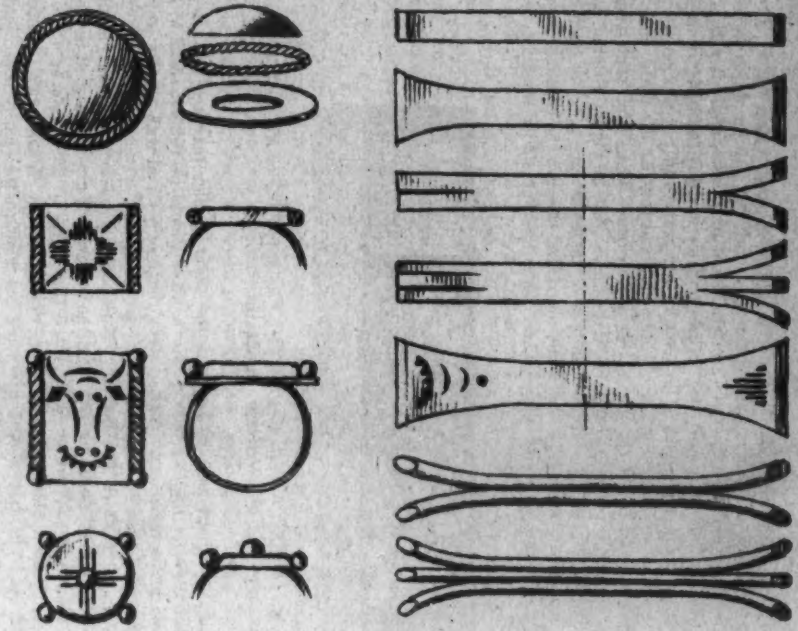
FIG. 12.

FIG. 13.

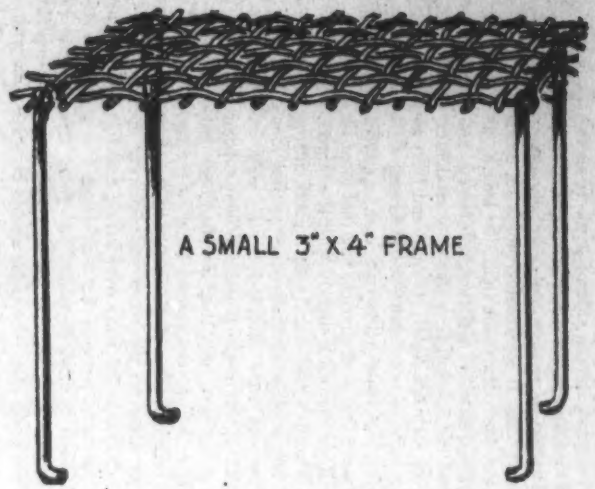
W.B.H

Plate 9

RINGS & BANDS



HEATING AND SOLDERING FRAME



W.B.H.

Plate 10

the three punch marks are put in right over the soldered joint.

Figure 3 is made out of stock, 5/16-in. wide. Scribe a line down the center and then two lines centered at each side of it, dividing the width into four equal parts. With the straight edged stamp or chasing tool, carefully follow the three lines. If the chasing tool is set down into the first depression half its length, as shown in Figure 4, and then hammered, you will find the line will be a whole lot straighter. Go over each line lightly at first, and then go over it once or twice more until the groove is smooth. The same holds true with a curved line except that a smaller chasing tool must be used. Bend the blank slightly with the fingers, as in Figure 5, and then, with a good cutting small file, work down the grooves so they look like the end view sketched to the right of Figure 3. It will be much easier to file the band after it has been bent than if it had been left flat. It calls for very careful filing to get the effect of four pieces of wire soldered together.

After filing up the edges and squaring up the ends, shape the rings over a ring mandrel or other round piece of metal or wood. Use a small wood or rawhide mallet for doing this shaping. Then try the ring for size. To make a good soldering joint, the edges should butt up quite truly. To achieve this, take a thin file, such as a magneto file or the small flat file that comes in sets of needle files, hold the ring as shown in Figure 6, Plate 9, and run the file between the two ends until they fit snugly.

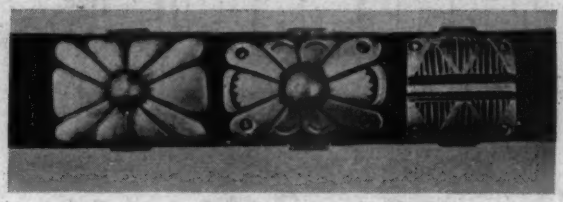
Then tie the ring together with thin, black, annealed iron wire as shown in Figure 7. The ends should be clean and flux should be put between the ends before wiring.

If the band possesses enough spring the soldering operation may be done without wiring, as shown in Figure 8. But there must be enough spring in the band to hold the ends tight and even.

Whichever way you choose, place the ring on a charcoal block, put a little more flux on the joint, and a small snippet of solder over that. Be sure the solder has flux on it also. Apply a medium flame slowly until the silver turns dark, and then watch for the flux and solder to melt. After the solder has hardened, remove the iron wire, and place the ring in the pickle bath to dissolve any adhering flux. Then rinse the ring in clear water, dry it, and touch up the joint inside and out with a fine file. It may be necessary to touch up some of the punch marks, and if the band shown in Figure 2 is being made, the nail set marks over the soldered joint will have to be punched.

Next polish the ring on a buffing wheel with crocus compound, or with finely powdered pumice and water and an old toothbrush. In all buffing, the thing to guard against is not to polish off too much of the stamped design. The file marks should be polished out, but silver is soft, and it does not take much to buff away shallow stamping. The Indians usually stamp their designs quite deep, in which case it is not so easy to spoil it by buffing.

The ring shown in Figure 11 is an Indian design, except that it has a *raindrop* soldered to the center instead of a turquoise. This design has been added here for the benent of those who have no stones on hand, or none of the right size. It is, nevertheless, an attractive ring. To make one like it, cut a piece of 18-ga. silver 11/16 by 1 in., and lay it out as in Figure 9. With a wide, straight-edged chasing tool (a good size is one with a 1-in. cutting edge), stamp the radial lines shown in Figure 10, about halfway through the metal. File as shown in Figure 11, and stamp the designs.



Modern Indian Indian

Variety in design

Then curve the blank, say about halfway between straight and the curve of the ring band. Figure 12 shows how this is done on a block of hardwood. The face must then be smoothed up with a fine flat file, after which it should be polished, as a better job of polishing can be done before the *raindrop* is soldered on. To make a large raindrop, take a piece of scrap silver 18 ga. by 3/16 by 3/16 in. Lay it on the charcoal block, put some flux on it, and heat until it melts and forms a ball. File the bottom, which is rather flat already, by rubbing it on a flat file. Then file the place it is to occupy slightly for a better fit. Place flux and a piece of solder 1/8 in. square in the center of the ring top, and place the silver ball on it. See Figure 13. Let the flux dry, so there will be no chance of steam forming and pushing the ball out of place. Heat evenly and slowly, and when the solder melts, the ball will settle down in place with a fillet of silver all around the base of it. Occasionally, however, these raindrops have a nasty habit of sliding to one side. In that case, heat the entire piece, from below, using the soldering frame shown in Plate 10, and when the solder melts, push the ball carefully over to where it belongs with a piece of iron wire.

The next step is to choose the band that is to be used with this ring. Whether the type of band chosen is one like that shown in Figure 14, Plate 9, or one of those shown in Plate 10, it should be cut and bent to shape. Then the ends must be filed to fit the bottom of the top piece as shown in Figure 15, Plate 9.

When two or more soldering operations follow each other, it is customary to use a hard solder for the first, and an easy-flowing solder for the next. For beginners, the use of hard and medium silver solders is rather tricky, because their melting points are higher than that of easy-flowing solder and, therefore, nearer to the melting point of sterling silver itself. It is well, therefore, to postpone the two solder methods and use only easy-flowing solder for the present. To do this, give the first soldered joint a liberal coating of powdered jeweler's rouge and water. Jeweler's rouge is a dark red powder which mixes with water. Mix it to a paste, apply it with a small brush, and let it dry. Its object is to absorb some of the heat. Now put flux on the places where the band touches the plate, and on the ends of the band. Then wire band and plate together as shown in Figure 16. Put a small snippet of solder on each place of contact, and add more flux. Observe the greatest cleanliness when soldering. The solder must be as clean as the silver. Solder that has been in a box for a while should be rubbed clean with jeweler's rouge or scraped with a knife to remove any grease or dirt.

Now place the assembled ring (Figure 16) on the soldering frame. If the ball is too large, force the wires of the frame apart to allow the ring to lie flat. Then apply the heat, and after the solder flows, let it cool a moment. Then cut and remove the iron wire, and while still hot, drop it gently into the pickle bath. Wash off the rouge with pumice and water. Inspect the job carefully. Perhaps there are a few places that must be touched up a little with a half round file. Then it is ready for polishing.

Tarnishing or Antiquing

The Indian likes his silver jewelry bright and shiny. The white man likes his with a dark tarnish in the low parts and a high polish on the rest of it. To give it this effect, brush the piece with a solution of liver of sulphur (potasium sulphide). The entire surface will immediately turn dark (if it is clean). Then polish as before, and the low places will stay dark. This is the finish used on the rings shown in the half tones.

Heating and Soldering Frames

This piece of equipment should be on every workbench. The grid is a 3 by 4 in., or a 5 by 7 in. piece of 14-ga. black iron wire screen with openings about 1/8 in. square. Make the stand of heavy wire about 5 in. high, and wire it firmly to the grid with binding wire.

The soldering frame is used when it is necessary to apply heat from below as well as from above, and as in the case of the ring just mentioned, and for heating pieces of sheet silver or wire for annealing. When annealing, it is advisable to have a large piece of asbestos below the stand or to set the stand in a 12-in. pan filled with coke. This not only prevents burning the bench top but helps to reflect the heat to the pieces being heated.

PORTABLE DRAFTING BLACKBOARD

RALPH E. HOPWOOD

Bakersfield, Calif.

It is necessary at times when teaching beginning mechanical drawing to draw lines on the blackboard with T square or straightedge. This task so often is not too simple as the T square or straightedge will slip down on one end, and crooked lines will result. It becomes more difficult still when triangles are placed on the T square to show the use of triangles with a T square.

This has been my experience many times in the teaching of mechanical drawing to seventh grade boys. I eliminated this trouble by using a special blackboard designed and constructed in our shop for the teacher's use. It is a portable blackboard with a T square attached, and so constructed that the wood frame which holds a piece of slate blackboard represents a drawing board while the blackboard represents the paper. The surface of the blackboard is flush with the surface of the frame and is held in place by flush metal clips so that the T square and triangles slide over it freely. This board is a great help in teaching proper tool technique.

The blackboard or demonstration drawing board is made two and one half times the actual size of our regular drawing equipment.

Portable blackboard for the drafting room

This is large enough so it can be seen from any part of the room.

Naturally, to make such a setup entirely workable, triangles are needed. These were made of ¼-in. plywood in both 30–60 and 45-deg. types. There is likewise a scale made from 3 by 3-in. soft pine, divided and marked to represent all of the scales of a triangular architect's scale. A regular blackboard compass may be purchased, or made, to complete the equipment.

The T square is constructed with a special clamp arrangement which holds it securely on the board at any height and supports a triangle as well. This clamp may be released easily with one or two fingers to allow changing the position of the T square. The blackboard slants backward at a slight angle so the triangles may rest on the blade of the T square without falling off.

Structural details are shown on a drawing which accompanies this article.

HOMEMADE PRECISION ENLARGER

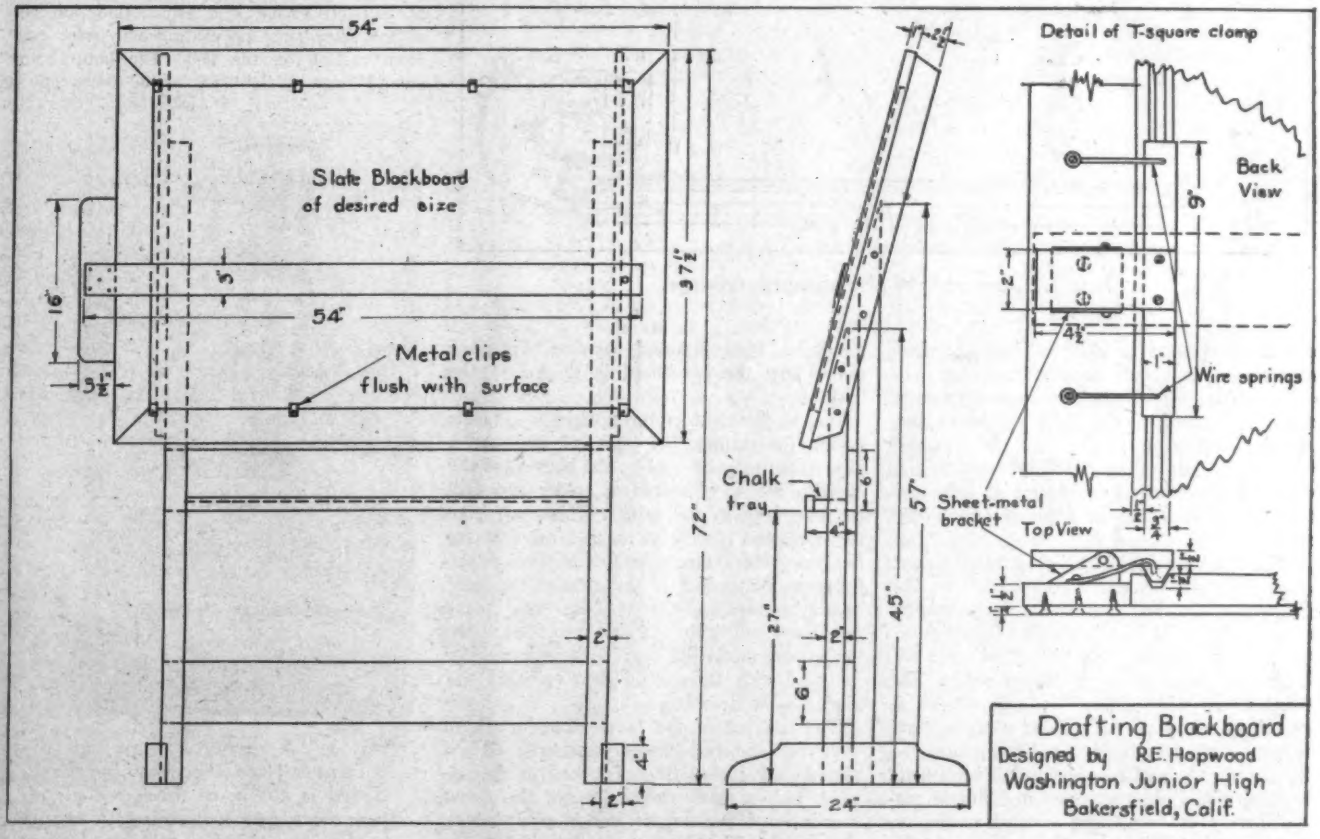
W. H. HEGEMAN

Waukon, Iowa

The enlarger described herewith can be made with the aid of but few tools. The total cost, including lenses, should not exceed $18. If you are fortunate enough to possess the lenses, approximately $3 will buy everything else you need.

This enlarger:

1. Will accomodate negatives up to 6 by 6 cm., or 2¼ by 2¼ in.
2. Is equipped with an F 3.5 lens of 50mm., or 2-in. focus.
3. Has a double condenser lens system.
4. Has a linear magnification on the baseboard of approximately 15 times, when the projector is at its highest point.
5. Uses 6-volt electricity.
6. Requires an ordinary 32 c.p. automobile bulb, which is sufficiently powerful to have



Portable drafting blackboard

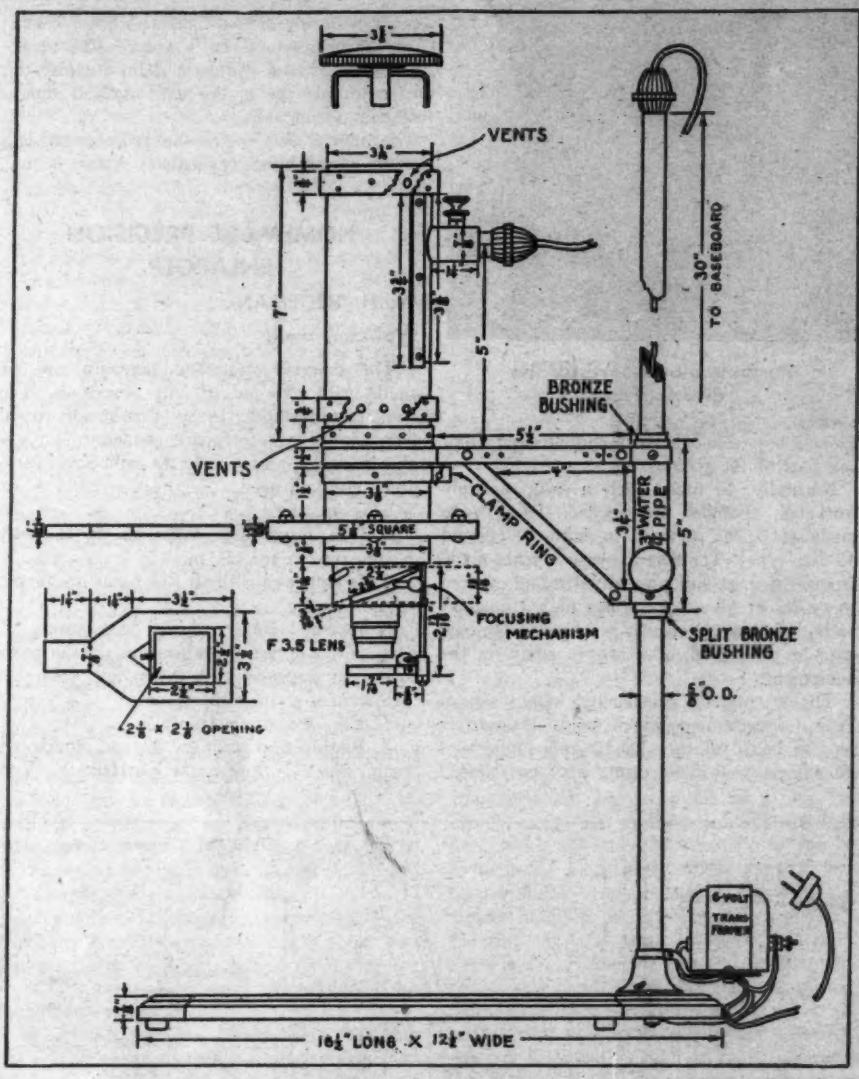


Fig. 1. Assembly of photographic enlarger

average negatives produce a fully exposed enlargement in about 10 seconds.

7. Generates so little heat that a negative may be exposed to the light for hours and remain unchanged.

8. Makes use of an iris diaphragm in the enlarging lens; hence, the degree of light and time of exposure may be adjusted to suit any negative.

The materials used in building this enlarger, aside from the lenses, were secured for the most part in the junk yard. For instance, the upright, a ⅝-in. nickel-plated steel tube, was once a robe rail that was attached to the back of a front seat of a junked sedan. The 5-in. length of ¾-in. water pipe was in a plumber's scrap pile. The iron used in making the supporting bracket and ring was found in a scrap box and cost nothing. With a little ingenuity and observation, many bits of material may be found and adapted to the requirements of this project.

The baseboard is made by gluing of two pieces of 3-ply plywood together. Figure 3 shows how the baseboard is shaped at the back.

Just to the right of the upright is a toggle switch for turning the light off and on. A pipe flange may be used at the bottom of the upright. Fill it with lead or solder and drill a ⅝-in. hole in the center. This may have to be reamed a trifle to make a drive fit for the pipe, which should be driven through the flange and extended the thickness of the baseboard beyond it. Drill a ⅝-in. hole in the baseboard and drive the pipe into it until the flange rests upon the board, where it may be fastened with three small screws. This will give a good firm foundation.

The position of the 6-volt transformer (a toy train or bell transformer will do) is shown in Figure 3. It is fastened to the upright with a small clamp. One of the 6-volt terminals of the transformer is grounded on the upright. The other one is attached to the single insulated wire that passes up through the upright to the single contact 32 c.p. auto bulb in the lamp house.

Figure 4 shows the shape of the bracket supporting the optical equipment on the upright. It is built of 1/16 by ½-in. strap iron. The circle is just large enough to take the condensing lens cell, shown to the left, which has a diameter of 3⅛ in. By a careful study of Figure 4, you will note that the condenser lens cell has a rolled edge. This edge acts as a stop and rests on the ring of the bracket, preventing it from slipping through. The arm of the bracket is built up of this same strap iron, drilled and riveted together, thus producing great strength and rigidity. The method of attaching the bracket to the 5-in. length of water pipe is also shown.

At both ends of the 5-in. water pipe shown in Figure 1, there is a split bronze bushing, which must be reamed out to a sliding fit on the upright. These form the bearings on which the entire projection assembly slides up and down. They may be purchased at any auto supply house.

In Figure 5 the pencil rests on the top surface of the upper condenser in the cell. Note that the lens does not come to the top of the cell. There is a space of about ½ in. above the lens. The lamp house is so built that it fits tight into this lens cell. Figure 6 shows a metal band riveted around the base of the lamp house. This is so placed that when the lamp house is fitted into the lens cell, the riveted ring rests on the rolled edge of the cell, giving it a firm foundation and at the same time preventing the lower edge from resting on the lens. The lamp house should form a tight fit in the lens cell so

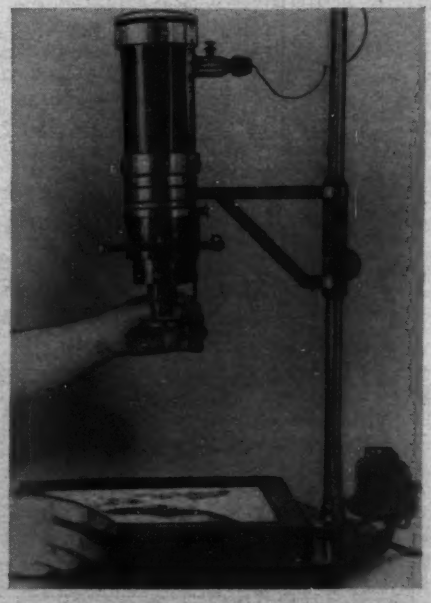


Fig. 3. A general view of the enlarger. Note the way the baseboard is cut in at the back giving it a more graceful shape. A toggle switch is used for turning current off and on

that when placed in position, it will remain so.

The condensers used in this system are known as 3-in. plano-convex condensers. There are two of them, and they can be bought complete in their mountings.

The lamp house is built of sheet copper. This was used because of its easy working qualities. The seam is made similar to that used on an ordinary tin can. Note the ventilating holes in Figure 6. They are ¼ in. in diameter, and are drilled or punched at regular intervals, as shown. The detail in Figure 2 shows the method of constructing the light-jacket ring which acts as a shield, preventing the light from coming out into the room. There is a space of ⅛ in. between the lamp house and the light-jacket ring, which is secured by using ⅛-in. lengths of copper tubing on the rivets.

Figure 6 also shows the method by which the light may be raised and lowered, thus increasing or decreasing its distance from the condensers. This is necessary to give the proper clearness and brilliance of field for different degrees of enlargement. When a light is at its greatest height, the center of the tube (⅞ in.), holding the lamp fixture, should be exactly 5 in. from the top of the crossarm and should be so built that it will slide down ½ in. This will give sufficient adjustment to clear the field and give maximum illumination for any degree of enlargement. Studying the detail of the sliding adjustment in Figure 2 will clarify the construction. The two strips of metal, *A* and *B*, are ½ in. wide and 3¾ in.

Fig. 4. This shows the shape of the bracket. The lens cell shown at the left fits into the ring, and the rolled edge of the cell rests on it. Note method of attaching the bracket to the 5-in. length of water pipe

Fig. 5. The pencil rests on the top surface of the upper condenser in the cell

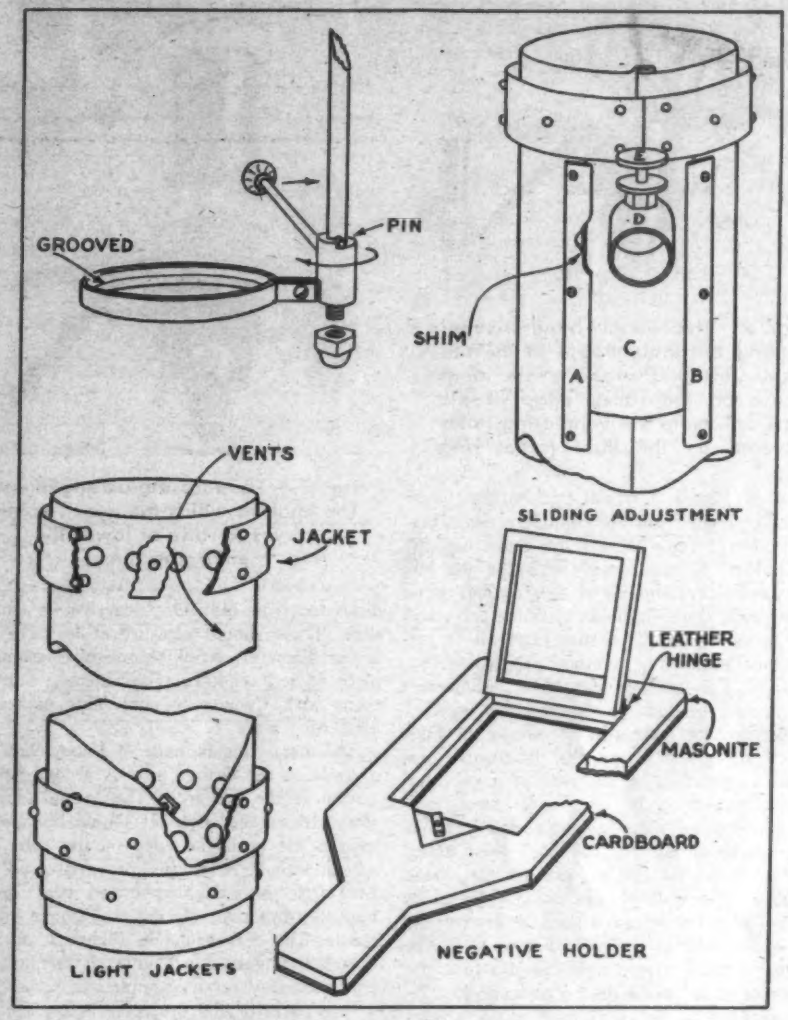


Fig. 2. Details of enlarger

long. Under each of these is a shim, so placed that when the parts are assembled, the sliding plate *C* may be moved through a distance of ½ in. It should fit loosely enough to be moved without difficulty, yet tightly enough to remain in the position you leave it.

The tube *D* is 1¼ in. long and ⅞ in. in diameter. This is a piece of brass tubing and is soldered or screwed into plate *C*. This holds the lamp fitting similar to those found in old auto headlights. They can ordinarily be bought in any auto supply house for a few cents. The thumbscrew *E* permits adjustment of the lamp to and from the center of the lamp house.

The top of the lamp house is a radiator cap, 3⅜ in. in diameter and costs only a trifle. It is double-walled. On the inside of the cap a number of ¼-in. holes are bored in a circle near the outside edge. There is a ½-in. hole bored in the center of the top of the cap. A light baffle is thus formed and additional ventilation secured. The inside of the cap is painted a flat black. Figure 1 shows the method of altering the underside of the cap to fit the top of the lamp house.

Now for the part below the supporting ring. This is also built of copper. Figure 1 gives the necessary information on dimensions. The entire lower structure is held to the condenser cell by a clamp ring, as shown in Figures 5, 6, and 7. This clamp ring is fastened to the copper cylinder by three rivets, one in front and one on either side. This leaves the rear half of the ring free to be compressed by the thumbscrew, thus holding the part below the crossarm firmly to the lens cell.

The 5⅛-in. square structure takes the negative holder and is made in this extra large size to provide free movement of the negative so that any or all portions of the latter may be brought into the field. It is built of two sheets of copper. A piece of iron, 5/16 in. wide by 1/16 in. thick, is bent to form three sides of an open square, 5⅛ in. on a side, with the opening in front. Short bolts are used to fasten it together.

The negative holder is built of Masonite. The dimensions are shown in Figure 1. The

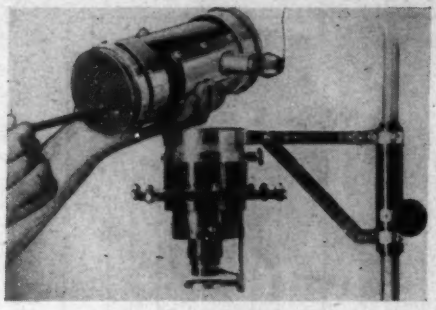


Fig. 6. The metal band riveted around the lamp house at the extreme left end supports the lamp house on the rolled edge of the lens cell. Note the ventilating holes covered by the light jacket ring

sketch in Figure 2 is self-explanatory. This particular holder will accommodate negatives of 2¼ by 2¼ in. There is no glass used in this holder; it does away with the use of *glass sandwiches* and all of the troubles connected with them. It holds the film perfectly flat, permits a ready change, and all in all is a most satisfactory method of holding the negative. For smaller negatives, additional holders may be built or reducing kits used.

The focusing mechanism is shown in Figures 5, 6, 7, and 8 and the dimensions are shown in Figure 1. It consists of a cylinder with a bottom in it, forming a cup, fitted closely into an outer cylinder and capable of rotating within it. The F 3.5 enlarging lens is fitted to the bottom of the inner cylinder. The wall of the outer cylinder is divided into thirds and a slanting groove cut into each third, as shown in Figure 1. In the groove at the extreme right, as you face the projector (the pencil points to it in Fig. 7) a small 3/16 in. rod, 1 in. long, projects from the inner cup. This serves as a handle for rotating the inner cup within the outer cylinder. In this way the lens may be raised or lowered, as the handle follows the groove, enabling the image to be focused sharply on the enlarging paper.

Short screws serve in the other two grooves, acting as guides and thus keeping the enlarging lens always parallel to the film and condensers.

The enlarging lens is a 50mm. or 2-in. lens F 3.5, and was bought for $12. The larger photo supply houses carry lenses of this type at prices varying from $5 to $20. The second-hand lenses are much cheaper and serve the purpose as well as new ones. It is very important to use a lens of this short focus, for it makes possible the getting of a 15 times linear enlargement on the baseboard, with only a 30-in. upright.

Just below the enlarging lens is the ruby glass (Plate 1, detail Plate 2, Figs. 3, 5, 6, 7, and 8). When the glass is in front of the lens, the light passing through it does not affect the enlarging paper, making it possible to locate it properly. By moving the ruby glass to one side, the exposure is made.

The ruby glass is made by cutting two

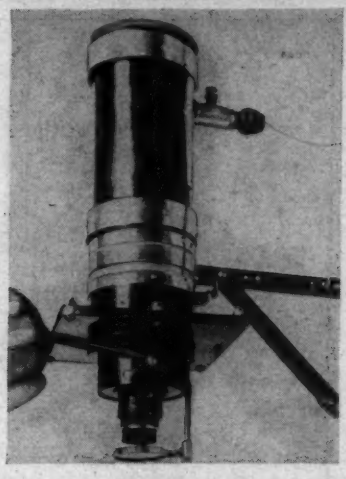


Fig. 7. The focusing arrangement. The knob to which the pencil points serves to raise or lower the enlarging lens

disks from an old glass negative or lantern slide. These should measure at least 1 7/16 in. in diameter. After thorough cleansing, a piece of red cellophane is cemented between them with Canada balsam. This makes an ideal ruby glass.

The metal ring is made of brass, bent into a circle of the desired size. A groove is then sawed in the center of the outside surface clear around the circle. It should be enlarged with a file until the edge of the ruby disk will fit into it. After the groove is completed, the circle is straightened and bent in the opposite direction, placing the groove on the inside. The dimensions in Figure 1, and the sketch in Figure 2 will give all the information necessary for its completion.

The parts of the projector below the condenser cell should be painted a flat black on the inside; likewise, the ventilation rings on the lamp house and the inside of the metal ring holding the ruby glass. A good flat black for this purpose may be made as follows: alcohol, 8 oz., lampblack, ½ oz., liquid shellac, 1 oz.

After the enlarger is completed, paint it with a good enamel and give the interior of the lamp house a coat of aluminum paint.

For holding the enlarging paper, use a

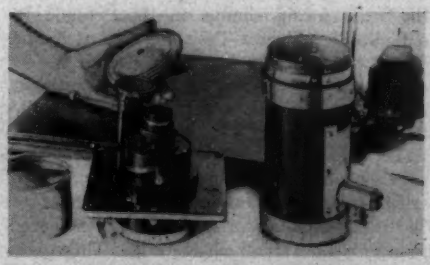


Fig. 8. Shows the enlarging lens fitted into the bottom on the inner cylinder. Also shows the component parts of the enlarger before assembling

regular printing frame of the desired size. It may be moved about under the ruby light, providing perfect freedom in locating the picture properly. It has many advantages over a fixed enlarging easel. However, if one prefers to use an enlarging easel, let it be independent of the baseboard, so that it may be moved about readily. This freedom of movement of the enlarging paper, coupled with freedom of movement of the negative holder, makes it possible to secure speedily and with the least difficulty the portion of the picture desired.

METHOD OF DETERMINING SHOP SUPPLY NEEDS

ROBERT JACOBY
Director of Vocational Education
Vocational School
Hershey, Pa.

Vocational schools differ widely in their method of determining the total quantity of supplies needed for a year's operation. They differ also in the method or procedure for purchasing and requisitioning supplies. In the small school having one or two industrial-arts shops the problem is simplified; however, in the ordinary vocational program consisting of four or more shops, the problem becomes increasingly difficult. In fact, this is one of the most complicated and time-consuming jobs of the vocational director. The complicating factor is the large variety and number of items which must be secured yearly when supplies for agriculture, carpentry, electricity, industrial arts, and machine shop are considered. The problem is further complicated because schools are required to purchase supplies and equipment by advertising for bids. As a result, composite lists of supplies used by the total number of shops within the school system must be made to facilitate their purchase in quantity lots.

In recent years, particularly, shop supplies for the new school term have been ordered far in advance of the opening of the school year. The common practice is to ask each shop instructor to submit on the proper requisition form the quantity, size, and description of items needed for the following year's operation. This is a time-consuming procedure since the number of items needed by one shop is in many cases a large list and this time-consuming practice must be repeated year after year. In addition, the instructor spends much time and effort in referring to supply catalogues in order to list complete and accurate descriptions of items. The inexperienced teacher ordinarily has difficulty in listing complete descriptions and often fails to list supplies in appropriate general groupings.

At the Hershey Vocational School the vocational director and staff have designed a plan for requisitioning yearly supplies which has eliminated most of the disadvantages previously mentioned.

The first step in developing this simplified method of determining shop supply needs is

Derry Township Public Schools
Hershey, Pennsylvania
Vocational School Supplies

Miscellaneous Items

Agriculture	Auto Body	Building Maint.	Carpentry	Electricity	Ind. Arts	Machine Shop	Pl. & Sheet Metal	Printing	TOTAL	UNIT	Description
1	1	2	3	2	2		2		13	ea.	Brush, dust, 8"
2	3		3	2		2		3	15	ea.	Brush, floor, 18"
2	3	2	2	3	3	12	4	2	33	ea.	Can, oil, 1/2 pint
		3		3	6	24			36	ea.	Combination drill and countersink, 1/8" drill diam.
		3		3	6	24			36	ea.	Combination drill and countersink, 3/16" drill diam.
1		1	3		1				6	ea.	Cutter, glass, turrett head
3	2	3	3	1	2	6	1		21	ea.	File cards
1		6	10		6			6	29	pts.	Glue, cold liquid, Le Pages
5		15	30		10				60	lb.	Glue, animal wood, flake
1	1	1	2	1	1	2	1		10	doz.	Handles, file for 3" to 6" file #1
1	1	1	2	1	1	2	1		10	doz.	Handles, file for 6" to 10" file #2
1	1	1	2	1	1	2	1		10	doz.	Handles, file for 10" to 12" file #2
1	1	1	2		1	3	1		10	doz.	Handles, hammer #5
1	1	1	3	1		1	1		9	doz.	Handles, hammer #6
1		1	1	1	1	1	1		7	doz.	Handles, hammer #7
		10			10	25			45	ft.	Leather belting, 1"
						40		20	60	ft.	Leather belting, 2"
25	100	50	100	50	50	100	50	50	575	lb.	Rags, wiping
		1	1		1				3	gr.	Screw hooks, square bent, 1"
		1	1		1				3	gr.	Screw hooks, square bent 1-3/4"
		1	1		1				3	gr.	Screw hooks, square bent 2-1/4"
	10	10			10		50		80	lb.	Solder, 50-50 bar
3	10	5		10	5		5		38	lb.	Solder, Kester acid filled

Fig. 1. List of specific supply items under each general grouping

to compile a complete and comprehensive master list of supplies needed by the various shops in the school system. This material can be secured by referring to orders of the past years, by referring to trade and school supply house catalogues, or to the *School Shop Annual* (March issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION) and by consulting with the shop instructors. In compiling this list, particular care is taken to include items used by more than one particular shop rather than specialized items. It is also important that the description of each item be as complete as possible. Listed below are some suggestive headings for grouping of items:

Paints and Stains
Finishing Materials
Abrasives
Lumber
Brushes
Drafting
Grinding Wheels
Angle and Band Iron
Sheet Metals
Steel
Drill Rod
Brass
Pipe
Pipe Fittings
Welding Rod and Flux
Hack Saw Blades
Nails and Brads
Wood Screws
Band Saw Blades
Straight Shank Drills
Taper Shank Drills
Milling Cutters
Reamers
Conduit and Fittings
Electrical Wire
Electrical Switches and Boxes
Miscellaneous Items

Specific items are listed under each general grouping on the form shown in Figure 1. Sufficient space is provided on the left side of the page for each shop instructor to indicate the quantity of each item desired. The master list is rotated from one instructor to the other for checking and any specialized items not appearing on the list are requisitioned on an individual requisition form. A secretary can quickly determine the total quantity of each item to be purchased so that the total requisition can be duplicated and mailed to supply houses for bids.

This plan for requisitioning shop supplies will save considerable time for instructors and directors since the major portion of a yearly requisition can be checked in a matter of a few minutes. In addition, descriptions are complete and standard, orders from individual shops are easily consolidated, and materials are easily allocated and distributed from the supply room to the shops.

CENTERING AN ISOMETRIC DRAWING

ANDREW E. MELBY
Baltimore City College
Baltimore, Md.

In the November, 1946, issue of The INDUSTRIAL ARTS AND VOCATIONAL EDUCATION Magazine, John Cox presented to the teachers of mechanical drawing a method of centering an isometric drawing. I should like to offer a method of solving this particular problem which requires no mathematics — only the ability to use a ruler.

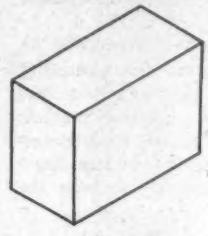


Fig. 1

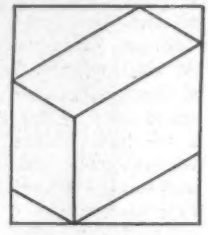


Fig. 2

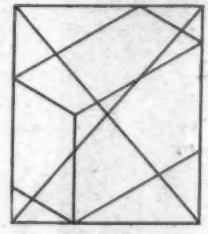


Fig. 3

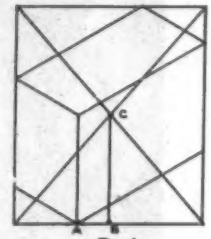


Fig. 4

Centering an isometric drawing

On a sheet of sketch paper or on the reverse side of the mechanical-drawing paper make an isometric drawing of a block as shown in Figure 1. This may be drawn any place on the paper. The dimensions of the isometric block should be laid out to the overall dimensions of the object to be drawn. Draw vertical and horizontal lines through the outermost points of the isometric as shown in Figure 2. Diagonal lines are then drawn to locate the center of the entire area to be used by the isometric drawing. See Figure 3. Draw a vertical line from the intersection of the diagonal lines, point *C*, through the horizontal line at the base of the drawing and thereby establish point *B*. Measure the distance from *C* to *B* and *B* to *A*.

When the border and title block have been completed on the mechanical-drawing sheet, find the center of the *drawing area* by drawing diagonal lines from the inside corners of the drawing space. From the intersection, point *C*, drop a vertical line and measure a distance equal to *CB*. Draw a horizontal line through point *B*, and measure a distance equal to *BA*. Point *A* will be the starting point for the isometric drawing.

There are drawings, of course, which do not

use the highest point of the box illustrated in Figure 1. In such cases the highest point is determined in the first step, Figure 1, and the top horizontal line in Figure 2 dropped to it.

This method of locating a starting point is very accurate and simple. No mathematics are involved — only the ability to measure.

OVERCOMING THE "FOUR DEMONS"

ROBERT W. CYNAR

Patrick Henry Junior High School
New York City, N. Y.

Teachers of shopwork appreciate the assistance given by visual aids. They also know that aids that can be handled by the student are more impressive and establish a stronger retention bond.

In our print shop we have developed an aid which satisfies the normal boy's curiosity of manipulation and at the same time has helped us solve the ever perplexing problem of the "four demons." We have tried numerous systems of identification, but our large-scale manipulative aid has by far been the most successful.

Fig. 1. The face of the models with the holes for the dowels

Briefly, it is a large-scale model of a piece of type, in the face of which a number of 5/16-in. holes have been drilled, as shown in Figure 1. Into these are inserted the stem and bowls of the "four demons." See Figure 1. The ¼-in. dowels in the stem and bowl fit into the bored holes on the face, thus allowing for the free manipulation of these two pieces, and thereby making any of the "demons" as they will first appear on a piece of type, and then as they will appear when printed.

Our lesson on types difficult to distinguish is usually presented after the students have had an opportunity to set their first project, which is a corner card. Here it would be needless to enumerate the difficulties they encounter with the *demons*. We make sure the students know that type is made upside down and also the reason it is made in this manner. By this time they know that type must be set with the nicks facing the outside of the

Fig. 2. The lower case p as it appears on a piece of type

stick, and that the correct method of recognizing type is to hold it as they would set it in the stick; that is, with the nicks facing the ceiling.

The model is placed on the desk with the nicks facing the ceiling. It is now made clear to the students that we are speaking of the character as it will appear on a piece of type, as shown in Figure 2. Now by moving the bowl to the opposite end (see Fig. 3), we see how that character will appear when printed. This process is repeated for the letters *b* and *p* several times, until the students can respond correctly. Then the stem is removed and placed on the other side to help them become familiar with the letters *d* and *q*. The novelty of the presentation always appeals to the students and they are given the opportunity to become quiz masters, and have their shopmates identify the *demons*. To help students master this problem, the linoleum block print, shown in Figure 4, is mounted on each type stand. This print also shows the character as it appears on a piece of type, and then how it appears when printed. This card, in conjunction with the manipulative aid, helps drive home the lesson permanently.

When teaching type nomenclature, we again bring our type model into use. To create greater interest, we compare a student to a piece of type, both having feet, body, shoulder, and neck, and both are recognized by their faces. Then the other names of parts of the type, such as nick, pin mark, grove, and serifs are introduced.

Now the question may arise, why is it

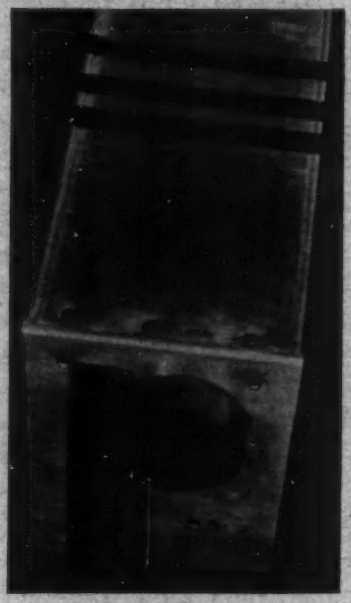


Fig. 3. By moving the bowl of the type to the opposite end the character is shown as it appears when printed

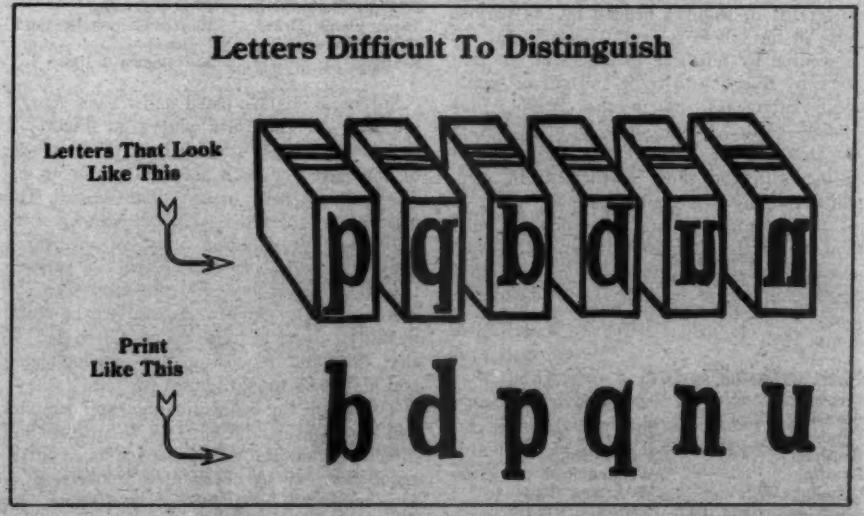


Fig. 4

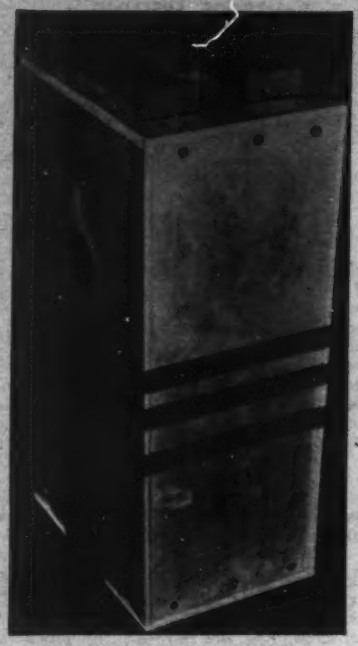


Fig. 5

necessary to have two characters? In the first place, it would be too complicated to have the correct serifs on the demons, since this would require four different stems. Using four different stems would entail so much manipulation on the part of the instructor, that it would certainly be confusing to the students and the original purpose of the lesson would be missed and the aid of no functional value. We have avoided this confusion by using a capital "H" when teaching nomenclature. See Figure 5.

The making of the model is a simple problem, but it would be of greater educational value if the project could be made as a co-operative endeavor with the woodshop. The model we use is 6¼ by 8⅜ by 16 in. The nicks, pin mark, and grove are painted on the model. The stem and bowl are made of 13/16-in. wood. The design of the characters depends on the ability of the maker. We made the stem 1¼ in. wide and the bowl so that it was strong enough for rough handling. Figure 6 illustrates the face of the model and may serve as a working guide. Special note should be made that this drawing illustrates the type area *only*. Allow a ⅝-in. margin on both sides of the *H*, one inch on top and bottom. To avoid the necessity of making additional holes, the dowels in the letter *H* are made so that they fit easily into the existing pattern; two dowels are sufficient to hold this character in place.

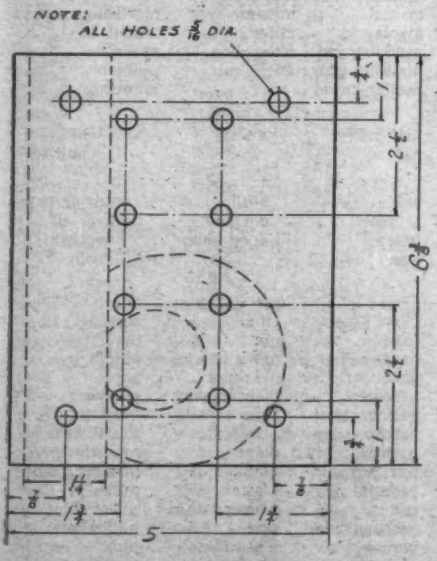


Fig. 6. Layout of dowel holes on face of model

CLAMPING DIFFICULT JOBS

R. C. NcNABB
Washington, D. C.

There are times, in the school and home workshop, when it is necessary to clamp non-rectangular jobs. For example, in gluing octagonal or hexagonal-shaped tables; aprons for round tables; shaped columns; doweled segments; etc., clamping is generally quite a problem.

Such jobs can be quickly and easily clamped with the equipment shown herewith. All that is needed is a hand-screw clamp; a strip of heavy, strong furniture webbing, small rope, or belting; and a short block of tough wood with the ends mitered as shown.

Put the webbing around the job at the point where pressure is desired. Then arrange the hand screw and block as shown, letting the clamp jaws angle slightly outward. The block should be kept well back against the front adjusting screw with the webbing extended well over the ends. First, take up as much slack as possible by hand; then, simply turn the outer screw of the clamp so as to bring the clamp jaws together. As the jaws come together, the band is drawn very tightly about the work.

Care should be taken not to angle the jaws of the hand screw too much, since to do so may bend the adjusting screw. Instead, release, take up the slack, then retighten.

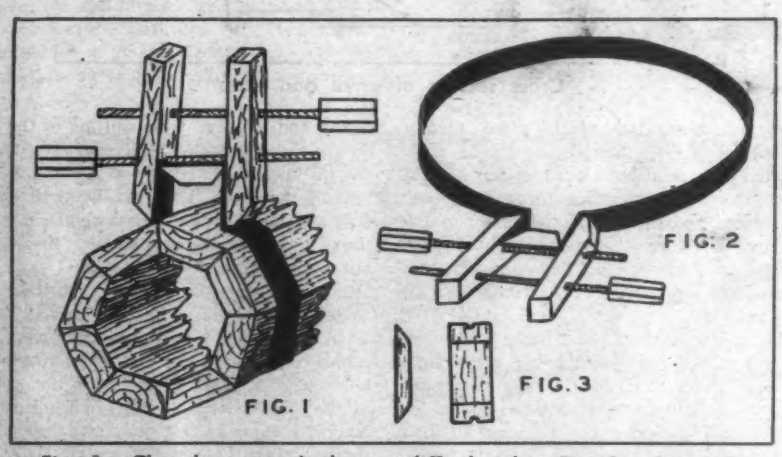


Fig. 1. The clamp applied to a difficult job. Fig. 2. Arrangement of band, block, and clamp. Fig. 3. Blocks with half holes in the ends which can be used with rope instead of the band

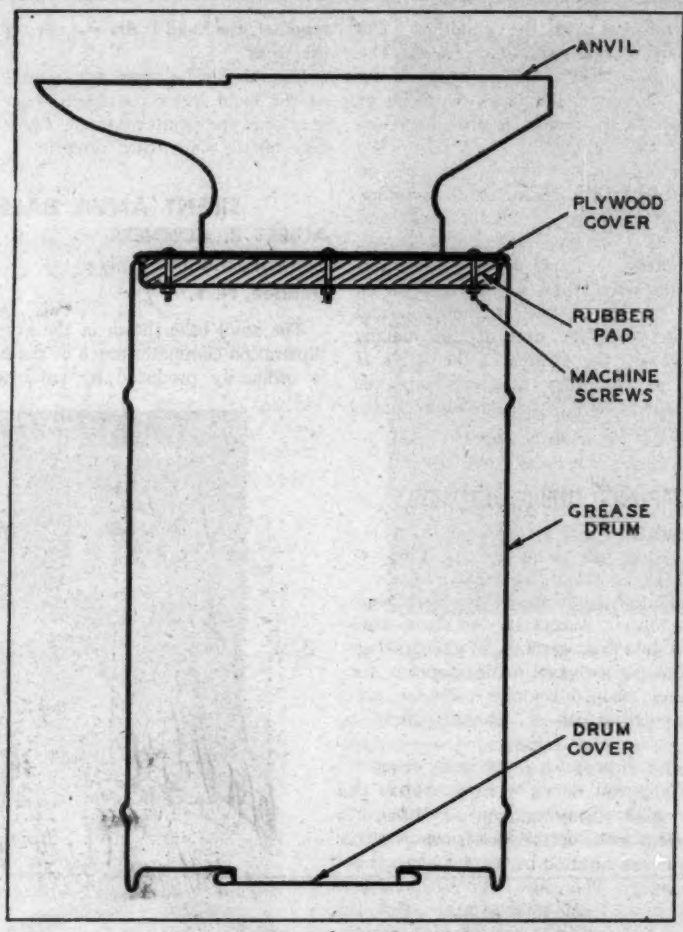
SILENT ANVIL BASE

ALBERT R. CONNERS
Central School
Dundee, N. Y.

The anvil base shown in the accompanying illustration eliminates much of the noise which is ordinarily produced by anvil work. This reduction of noise results in more pleasant working conditions in the shop and decreases the possibility of accidents. Such a device is especially advantageous in schools where the shop is adjacent to classrooms. In such cases the use of the anvil for forging and ornamental ironwork need no longer be curtailed because of the possibility of disturbing the rest of the school.

Silent anvil base

In the silent anvil base, the anvil is mounted on sponge rubber pads which are, in turn, mounted on an empty grease drum. Since



Cross section of anvil and base

sound is transmitted much more readily through solids than through the air, an anvil mounted on a solid base will transmit a great deal of noise and vibration through its base to the floor and thence to other parts of the building. However, the sponge rubber pads absorb practically all of this vibration and thus effectively reduce the main source of anvil noise.

To construct this anvil base, obtain an empty one hundred pound grease drum from a garage or service station. These small drums raise an anvil to a convenient height and are rigid enough to support the weight of an anvil without difficulty. Since the drum is turned bottom side up when completed, any grease which may remain in it should be wiped out so that it will not leak out on the floor later on. When the can is turned bottom side up it will be found that the bottom is depressed about ¾ in. below the edges. This area is covered with sponge rubber and the anvil placed on the rubber. Two or more sponge rubber kneeling pads may be used. These are cut and pieced together to completely cover the base of the drum. Rubber cement is used to hold the pieces together and to fasten the completed pad to the drum.

A sheet of plywood with an opening sawed in it to accommodate the base of the anvil is placed over the rubber pad to protect the rubber and to prevent the shifting of the anvil on the pad. First, saw a piece of plywood (of any thickness) to a circular shape to cover the base of the drum. Then set the anvil on this disk and mark around the base. Drill a hole through the area to be removed, then saw it out with a jig saw or a compass saw. Drill four holes through the plywood to insert machine screws to attach the plywood to the drum. Place the plywood in position on the rubber pad and mark the location of these holes with a pencil. Also mark the position of the holes in the bottom of the drum with a center punch (this is done through the rubber, which is easily pierced). Drill holes through the rubber and the base of the drum.

In assembling the unit, the plywood disk is placed over the rubber pad, the machine screws are inserted and the nuts tightened on the inside. Next, the drum cover is fastened on the open end of the drum, then this end is turned down to rest on the floor. The anvil is then lifted into position on the other end. Since the plywood frame is cut slightly larger than the base of the anvil, the anvil does not actually contact it, but rests entirely on the pad. This is important if best results are to be obtained. After the assembly is complete, the anvil and the base may be painted in colors which harmonize with the color scheme of the shop.

TRADE SPELLING

(Continued from page 294)

gauge
gauging
German siding
gimlet
girder
girt strip
glass cutter
glazed
glazed door
glazing
glue
Gothic
gouge
grade
grading
graduation
grain
green wood
grind
grindstone
groove
ground
gumwood
gutter
gypsum

H

half-lap
half-round
halving
hand drill
handrail
handsaw
hand screw
hanger
hanger bolt
hanging stile
hardwood
harmonize
hasp
hatchet
haunch
hearth
heartwood
heavy joist
height
hewing
hickory
hinge
hip rafters
hip roof
hone or oilstone
horizontal
horse
Howe truss
hypotenuse

I

I beam
import
incise
indicate
industrial
interior
intersect
Ionic

J

jack
jack plane
jack rafter
jack screw
jacking up
jamb
Japan drier
jig
jig saw
jogged
joiner
joinery
joint
jointer plane
joist
journeyman

K

kerf
key plate
kiln-dried
king post
kit
knocked down
knot
knurl

L

lacquer
lampblack
lap joint
lath
lathing
lattice
laying out
layout
ledger
length
level
lever
light
light cut
lime
lineal foot
linseed oil
lip
lip molding
locate
lock
locking stile
locust wood
louver

M

machine
mallet
manhole
manipulation
mansard roof
mantel
maple
marking awl
marking gauge
master-keyed
matched boards
measurement
mesh
mildew
millwork
mission type
miter
miter box
miter cut
miter plane
miter saw
miter square
mortise-and-tenon
mortise
mortising machine
mount
mudsill
mullion
muntin

N

nail puller
nail set
neck
newel
nulling

O

oak
octagon
offset
ogee
oilslip
oilstone
open shop
out of true
over-all
overhaul
ovolo

P

paint
paint base
panel
panel saw
panel strip
parallel
paring chisel
parting strip
pattern
pavilion
pedestal
peg
perpendicular
perron
picket
pier
pilaster
pile driver
pillar
pin
pinch bar
pin knot
plain sawing
plan
plancier
plane
plank
plaster
plaster board
plate
plate glass
platform
pliers
plinth
plow
plumb
plumb bob
poplar
porch
portico
Pratt truss
precarious
priming paint
pulley
pulley block
pulley stile
punch
purlin
putlog
putty

Q

quarter bend
quarter sawing
queen truss
quirk bead
quirk molding

R

rabbet
radius
rafters
rail
rake
ramp
rasp
ratchet
ream
rebate
red cedar
red oak
replacing
revolution
ribbon strip
ridge
ridge board
ridge capping
ridge pole
ridge roof
right angle
ripping
ripsaw
rise
rise and run
riser
roof boards
rosewood
rosin
rostrum
rottenstone
rough cut
rout
router
rubberoid roofing
run
rung

S

safety first
sand
sanding
sandpaper
sapwood
sash
sash bars
sash lift
sawhorse
saw set
saw-toothed
scaffold
scale
scantling
scarf joint
scissors truss
scoring
scotia
scraper
screen
screw
screw clamp
screw jack
scribe
scroll saw
scrollwork
scutcheon
seasoning
segment
semicircle
semicircular
shake
shank
shape
shaper
shear
shears
sheathing
shellac
shiplap
shore
shoring
short length
show rafter
shrinking
sill
skewback saw
skirt
skirting
slack
slamming stile
sledge
sleeper
slicing cut
slip stone
snapping lines
socket chisel
socketing
socket
soffit
spandrel
specification
spike
spike knot
spindle
spirit varnish
splat
spokeshave
sprig
spruce
sprung molding
square
staff bead
stagger
staging
stain
stainless steel
stair treads
stall
standard
star shake
steel square
steel wool
steeple
still
stool
stoop
stop
storm sash
stove bolt
straight-peen
straight-shank
straightedge
string
stringer
strut tenon
stud
studding
style
subbase
subfloor
superstructure
swivel

T

tail beam
tail joist
tang
tangent
taunt
template
tenon
tensile strength
three ply
threshold
thumb screw
tie
tight fit
tile
tongue
tool steel
torus
trace
trammel
transit
transom
tread
trellis
trestle
trimmer
trimming joist
trowel
truss
try square
turnbuckle
turpentine
Tuscan
twist bit
twist drill
tympanum

U

upholstery
upright

V

valley
valley rafter
varnish
veneer
ventilation
veranda
verge
verge boards
vertical
vestibule
vise
vise clamps

W

wainscot
wainscoting
wainscoting cap
wall bracket
wall plate
wane
washer
waste
water table
wax finish
weather
weatherboards
weathering
webbing
wedge
white cedar
white lead
white oak
white pine
whiting
whittling
wicket
wind
windlass
window head
wire glass
wood finishing
wood screws
working edge
wreath
wrench

Y

yardage
year ring
yellow pine
yoke

Z

zero
zigzag rule

A DRAFTING ROOM STOOL

LEONARD FLAA

Public Schools
Ishpeming, Mich.

When our industrial-arts department was asked to give a course in engineering drawing during the war emergency we found there was a shortage of two dozen stools for the drafting room. As they could not be purchased at that time, necessity compelled us to design and make the stools out of whatever material we could gather or salvage.

Fortunately, we had some birch in stock for the seats. The legs were made of local second growth oak, somewhat air-dried. The braces were cut from 16-ga. galvanized sheet iron from discarded corset patterns salvaged from the local Gossard corset factory. The screws were obtained by dunning the hardware dealers and searching the five and dime counters in the vicinity. The stools have now been in use for three and one-half years. They have stood the gaff and we have yet to reset a screw or make the first repair.

The stools can be made in any shop that has the most scanty equipment. While our seats were turned in the woodshop they can be cut out and finished by hand if that should be necessary. The legs can be made of squared stock of any strong tough wood. The braces, made of 16-ga. sheet iron, can be cut and fashioned with the use of common hand tools, such as the scriber, vise, square, hammer and cold chisel, hand drill or punch, hack saw and files, plus some ingenuity. However, if more equipment is available the job becomes proportionately easier.

The accompanying illustrations show the completed stool and the steps in making the

Fig. 3. The assembled stool

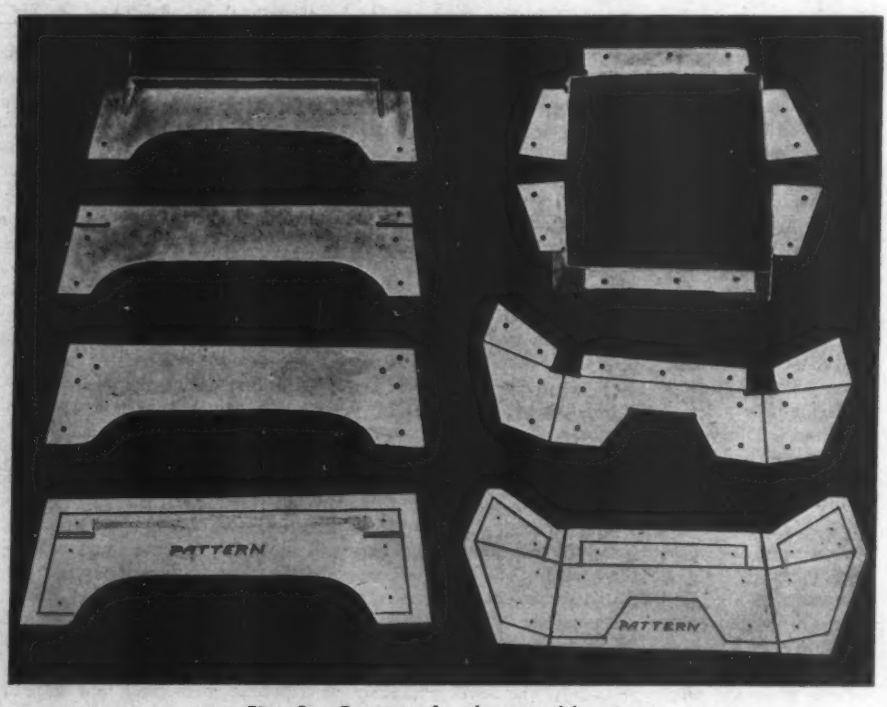


Fig. 2. Patterns for the metal braces

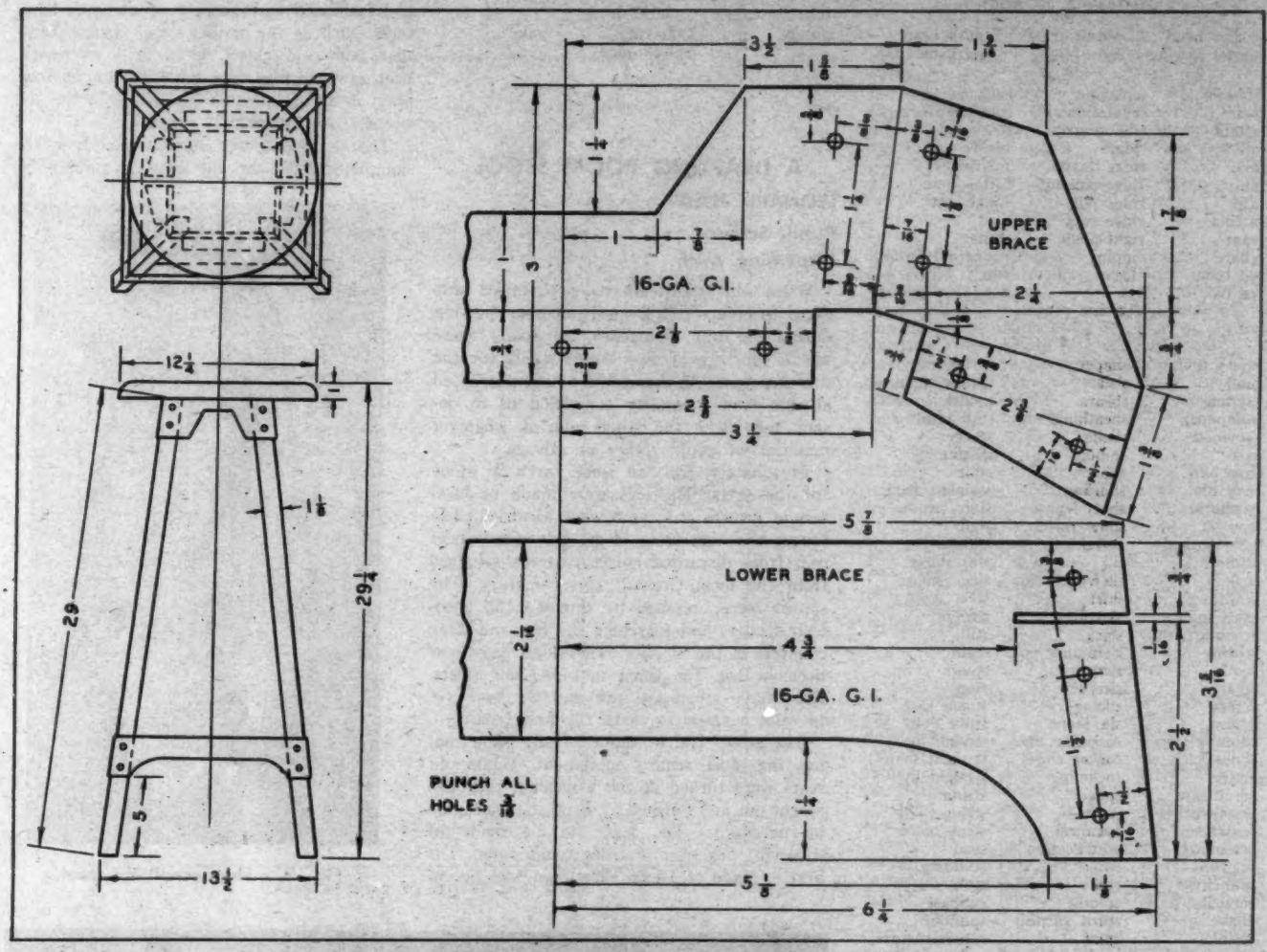


Fig. 1. Details of drafting room stool

braces. Figure 1 shows the dimensions and shapes of the metal and wood parts. Centers of screw holes on braces are omitted as their location depends on the size of the legs.

Figure 2 shows the patterns used for laying out the metal braces. One of the important features is the placing of the upper braces. The continuous brace is always run across the grain under the seat. This prevents the seat from cracking or splitting through the center and adds to the strength and rigidity of the structure. Use No. 9 by ¾-in. r.h. screws, but set them by using the proper size drills for pilot holes. A drop of linseed oil on each screw hole adds to the ease of driving, lessens the danger of shearing, and holds the screw securely.

In our shops the metal parts were made in the metal shop. The wood parts were worked up in the woodshop and the assembling and finishing was done there also. Beveling the ends of the legs was done by placing them in V blocks and cutting the proper bevel in the circular saw. C clamps were used to hold the legs tight in the top and bottom braces while the screws were set. The lower braces were placed last.

WELCHBOARD — A LUMBER ECONOMY

A. R. WUEST
President
West Coast Plywood Co.
Aberdeen, Wash.

There is a misconceived idea that America is depleting her timber resources so rapidly that in a few years a serious shortage will exist.

It is very true that during the past several years, due to the demands of war and reconversion, the volume of timber harvested exceeded new growth to a considerable extent. Were this trend to continue, a serious dearth of timber would result eventually.

However, it is inconceivable that American industry will stand idly by and watch a serious situation develop. In the first place our potential for growing new timber has hardly been touched. To quote Colonel Greely of American Forest Products Industries, "By putting forth the proper effort, America is capable of attaining an annual new growth of 72 billion feet."

Offsetting this statement we have the February 20 report of the Research Institute of America. This contains an estimate of America's annual timber needs by the year 1950, and places the figure at between 46 and 64 billions board feet, predicated on a national employment figure of 62½ million people at that time.

By comparing those figures, it is clear that the potential annual new growth in this country alone exceeds the estimated future drain on our timber resources by a comfortable margin, and yet there are other favorable factors to be considered, the principal of these being greater yield from the tree.

Necessity has ever been the mother of invention, and new means have been and will continue to be discovered whereby more and more of what constitutes waste today will be a finished product tomorrow. In other words, the expanded needs of our people for forest products in the future, may very well be met, not by cutting down more trees, but rather by greater utilization of those trees that are felled.

When A. R. Welch set out a number of years ago to develop a new product, he did

so with a dual purpose in mind. One was to produce a finished article superior to the raw wood itself; the other was to utilize waste in its manufacture. In the product which emerged — *Welchboard* — he has accomplished both objectives. This is merely the beginning. Any idea that America will run short of timber is a fallacy.

Welchboard is plywood with a smooth, relatively hard, durable surface added. A. R. Welch, vice-president of the West Coast Plywood Co., Aberdeen, Wash., and the inventor of the product, describes it as "plywood plus."

In surface appearance, the new material is about the color of the wood from which it is made — light tan in the case of Douglas fir — but uniform and without grain pattern as the covering ply is comprised of minute wood fibers inseparably bound together.

Perfection and production of the refined product is of threefold significance:

1. It is an advanced panel material having all the inherent strength and other physical properties of plywood but with a superior, completely smooth surface as a base for the finest of finishes. The extra layer is formed of pulverized wood fiber, impregnated with resin and compressed under heat and pressure.

2. Plywood which though structurally sound is not suitable for fine finishing, acquires appearance properties surpassing even that of the panels previously considered of top quality when faced with the Welch-developed homogeneous covering.

3. Conservation of raw material is achieved as the layer bonded to the plywood is manufactured almost entirely from clean wood waste at the factory that otherwise would be discarded or burned. The volume of panels produced can be increased perhaps 25 per cent over that previously obtained from the same amount of raw material (logs).

The Welch-devised surfacing is about 1/16 in. thick. It is bonded permanently to the plywood by *setting* or polymerizing the material in great presses that apply both heat and pressure.

Only exterior-type plywood, bonded with completely waterproof adhesives, is utilized as a base, and the high-grade resin used as a binder in the surface likewise is waterproof. Accordingly, the finished panel of Welchboard is suitable for outdoor as well as indoor use although it is intended to be painted or given other suitable finish. It will withstand repeated wettings, long-time soaking, or even boiling.

All the wood fiber for the smooth, dense surfacing is recovered from factory waste. All that is added to this wood, which though finely ground is not changed from its original form, is a small quantity of high quality resin binder.

There is, of course, no grain apparent in the surface of Welchboard inasmuch as the outer layer is comprised of the pulverized wood particles bound together as a homogeneous material. The surface completely masks the base panel. The surface may be applied to either or both sides of the panel.

The same mixture of waste materials and resins has other applications besides the surfacing of plywood. It can be used to repair economically and efficiently the defects in veneers such as knotholes and splits. It can also be pressed, in plywood plant presses, into a homogeneous board material of various thicknesses. Such a board, while lacking many of the structural properties of plywood, would be competitive with other fibrous board products and would have wide uses in industry and housing.

GRAPHIC SOLUTION OF A VOLUMETRIC PROBLEM

J. T. SAWHILL

Colorado Springs, Colo.

Given: A 2-in. cube, *A*, to construct a cube, *B*, having twice the volume of *A*.

Procedure: Draw a 2-in. square to represent one face of the given cube. See square *abcd*, in Figure 1. Make an oblique drawing of the cube using 30-deg. slant for all receding lines. Note, however, that measurements are not taken on the receding lines for this development. The necessary measurement is taken on line *ab* extended to *x*. The measurement *bx* is always one fourth the length of line *ab*. From *b* the receding line *bh* is drawn at 30 deg. The true length for the enlarged cube is the diagonal line *ah*, giving the required line for constructing a cube having 16 cubic inches volumes and also, for constructing a sphere having two times the volume of a 2-in. sphere.

This procedure can be followed step by step for finding twice the volume of a cube of any size, and the development can be laid off with a compass. By using one fourth the edge of the cube the dimension for the width of the right face of the cube is obtained. This method of drawing differs from the usual oblique in that the width is not measured on the receding line *bh*, but is measured on the extended line *bx*. Point *h* is the intersection of the 30-deg. line *bh* with the vertical line *hk*. The diagonal of the top face of the cube (drawn by this method) gives the true length for one side of cube *B* (the enlarged cube). With the compass bisect line *ah*, and use this half-length to construct a small cube. This cube will have one eighth the volume of cube *B*. (Since ½ by ½ by ½ equals ⅛). Thus, we have a series of three cubes; the given cube has a volume of 8 cubic inches, the enlarged cube a volume of 2 by 8, or 16 cu. in., and the small cube a volume of one eighth of 16, or 2 cu. in.

Proving these lines: By making a drawing using the metric system, the true length of lines is readily tested. Thus, draw a cube face 4 dm. (decimeters) by 4 dm. *Ab* then is 4 dm. long, and *bx* is one fourth of *ab* or 1 dm. From point *b* draw a 30-deg, vanishing line as shown, locating point *h*. The diagonal *ah* then is 5.03322 dm. The cube root of the doubled volume 128 is 5.03968, a difference of only .00646.

TURNED FRUIT BOWL

E. V. RHODES

The Montgomery Blair High School

Silver Spring, Md.

There are at least two reasons why a purchased wood turned lamp, candy dish, or fruit

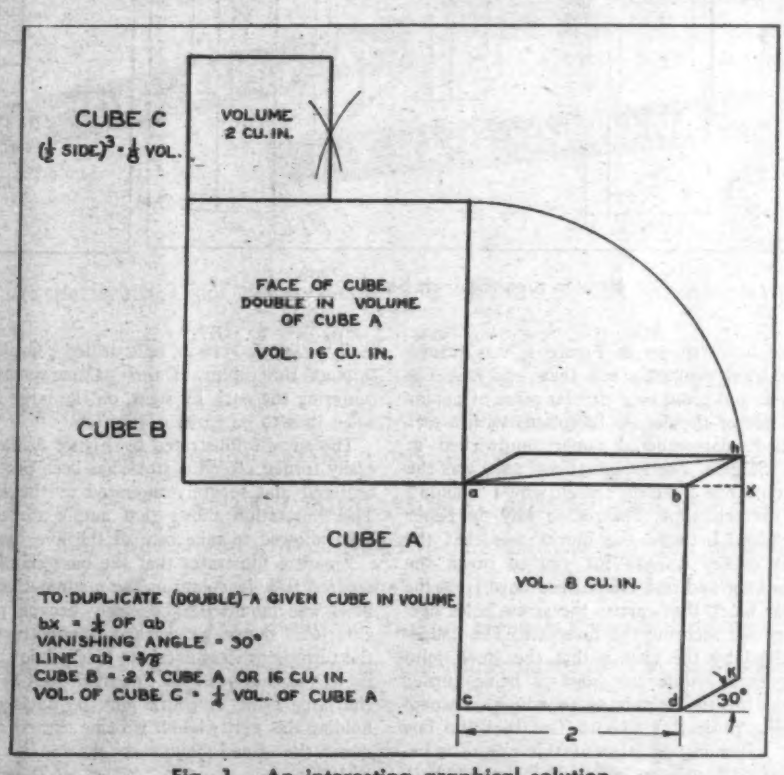


Fig. 1. An interesting graphical solution

bowl may have a coat of felt cloth on its base. One reason is that the felt covered base will not injure a delicate finish on which it rests and the other is that felt will cover unsightly wood screw holes that were caused by faceplate turning.

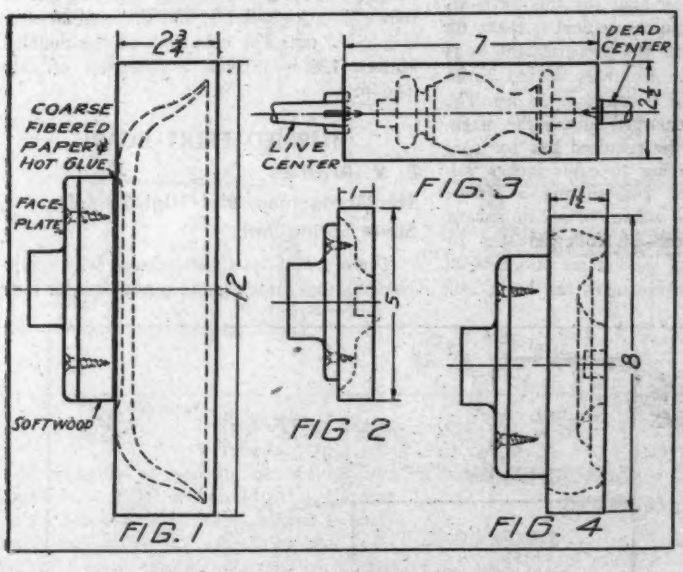
The fruit bowl described in this article was designed and made in such a manner as to eliminate the necessity of covering, or the filling in of screw holes with plastic wood or stick shellac. Because of this the steps in the completion of the project are increased in number and the time involved is doubled.

The fruit bowl was made in four major operations, three of which, Figures 1, 2, and 4, are faceplate operations. The other, Figure 3, is elementary spindle turning. As for the type of wood, I would recommend black walnut if it is obtainable. For the finish I suggest the boiled linseed oil finish after each part has been well sanded. The sanding and finishing can be done while the piece is still on the lathe.

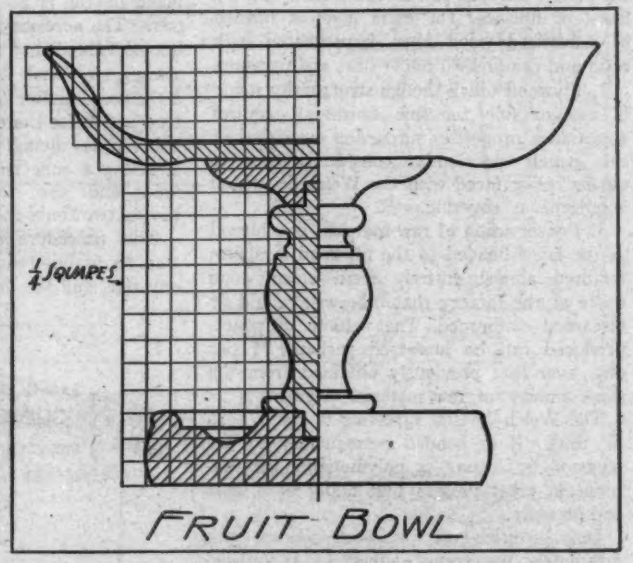
The second part on which the bowl rests (Fig. 2), may or may not be turned with a piece of softwood glued with paper to the walnut stock that has also been cut circular. It may be that the individual may wish to begin this project with Figure 2 which is smaller and less dangerous if the joint should break. It may be best to experiment with the glue, paper, and the process of breaking the joint by turning this part as was recommended for the bowl. However, I found it unnecessary and turned this part as illustrated in Figure 2. The 1-in. hole for the tenon of the spindle in Figure 3 should be cut with lathe tools and should be checked closely for the proper dimension. This may appear trivial but it is important that the completed project be perfectly erect. A 3/16-in. hole drilled completely through the center of this part may aid in centering the part, by sight, on the large bowl when it is to be glued in position.

The spindle illustrated by Figure 3 may be easily turned after the stock has been properly centered and securely mounted in the lathe. The illustration shows that ample stock has been allowed to take care of the live centers.

Figure 4 illustrates that the base should be secured to a faceplate in the manner that the bowl was mounted. The easily broken paper glue joint should be checked frequently while the turning process is taking place. One should be just as cautious with this small part as with the large bowl. A chuck may be devised for holding this part while it is being turned. However, the glued joint, as shown, is quite satisfactory.



How to turn the fruit bowl



Details of fruit bowl

Personal News

CHARLES W. SYLVESTER PROMOTED

On June 3, 1947, by unanimous action of the board of school commissioners, Charles W. Sylvester was promoted from the position of director of vocational education in Baltimore, Md., to that of assistant superintendent for vocational education. He will continue his activities in the interest of vocational education as a member of the board of superintendents. Coincident with this well-deserved promotion, Mr. Sylvester is rounding out his twenty-fifth year of service as director of vocational education in Baltimore. The board of school commissioners of Baltimore City and the superintendent of public instruction, Dr. William H. Lemmel, who recommended this promotion, are to be congratulated for this recognition of Mr. Sylvester's loyal and outstanding services in the interest of public education in Baltimore.

Those closely associated with Mr. Sylvester have learned to appreciate his rare business acumen, his keen perception and deep understanding of problems in all phases of education, his devotion to vocational education both locally and nationally, his intelligent and farsighted plan for the development of a counseling program and a scientific aptitude testing program to aid pupils in their selection of vocational courses, his versatility in managing and directing sundry activities, his high ethical standards, and his infectious quality of inspirational leadership. Small wonder that a person so well equipped should be honored by such a promotion. Undoubtedly, Mr. Sylvester's qualities were recognized by Supt. Lemmel soon after he took his office as superintendent in Baltimore last July. For ten months prior to Mr. Sylvester's promotion he sat regularly with the board of superintendents at the request of Superintendent Lemmel.

Thirty-nine years ago, Mr. Sylvester entered the teaching profession as instructor of manual training in Norfolk, Va. For 14 years he served successively as instructor, supervisor, and director at

(Continued on page 22A)

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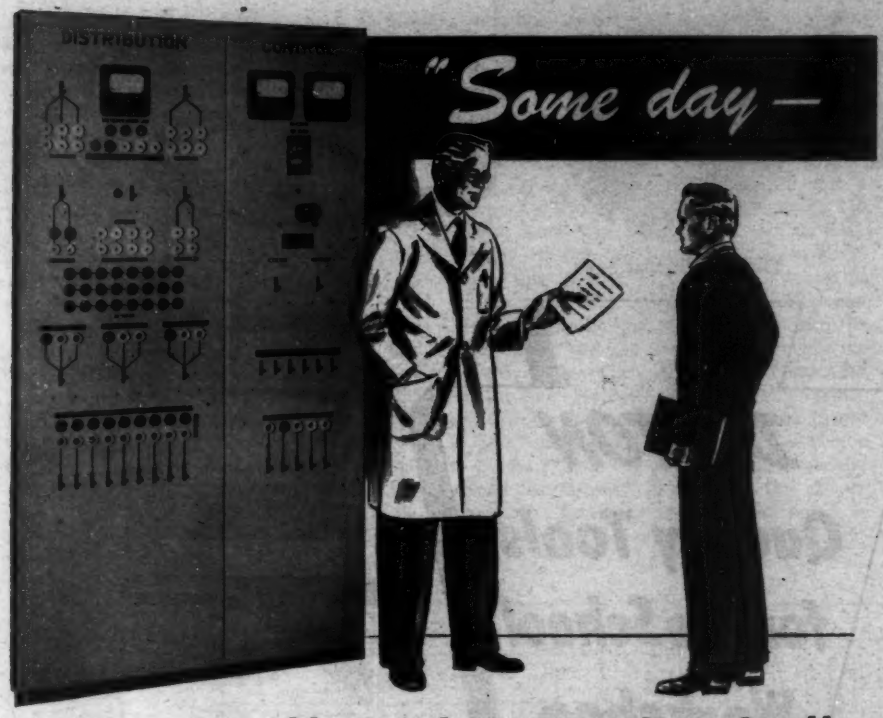

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(Continued from page 312)

Indianapolis, Ind.; Springfield, Ill.; and Hammond, Ind. Prior to assuming his position in Baltimore, he was district vocational officer for the Federal Government in directing the rehabilitation of disabled soldiers of World War I in Illinois, Michigan, and Wisconsin. Without a doubt, Mr. Sylvester was not aware at the time that his experiences in directing this rehabilitation work would prove to be invaluable in setting up the program for National Defense Training followed by the War Production Training Program in which over one hundred thousand workers were trained in Baltimore's Vocational Schools during a five-year period. And today, the training of eight hundred veterans in thirty full-time courses, distinct and apart from the regular day school activities, is being efficiently done under his able direction.

Under Mr. Sylvester's administration as director, the program of vocational education in Baltimore was developed upon a sound philosophy aimed at meeting the needs of boys and girls at many levels of ability. Over the years there was evolved the present Multi-Level Plan of Vocational Education,[1] which has been in successful operation since 1935. This plan is unique in America today. Many educators point to it as a pattern for vocational education. Some idea of the administrative problems associated with the multi-level plan may be gained when it is realized that the first and second levels cut across the entire program of elementary education while the third and fourth levels cut across both the junior high and senior high programs. Today there are 6600 boys and girls enrolled in the four levels of vocational education and an additional 5400 students enrolled in the business education courses in our general high schools.

[1]For a detailed discussion of the Multi-Level Plan of Vocational Education in Baltimore, and the program of Aptitude Testing, see the *American Vocational Journal* of September, 1943, Vol. 20, No. 7.

Charles W. Sylvester

Mr. Sylvester is well known in educational circles throughout the nation. He has participated in many conferences and meetings in the interest of vocational education from coast to coast. His position as treasurer of the American Vocational Association for the past twenty years has carried with it many duties and responsibilities national in scope. His mature judgment and wide experience in the field of vocational education has been availed of on many occasions in the interest of securing federal legislation for vocational education and in setting up policies and standards for the administration of such legislation. Of recent import is his attendance as representative of the American Vocational Association at the final regional conference held in Chicago recently to review the deliberations of five regional conferences on the Prosser Resolution which were held over a period of two years in as many cities of the country.

On June 9, 1947, friends and co-workers of Mr. Sylvester held a banquet in his honor at the Lord Baltimore Hotel, Baltimore, Md. The program included testimonial speeches by prominent local educators and representatives of industry, the presentation of a bound volume of over 400 testimonial letters from friends all over the nation, and the presentation of a fine gold watch and a pair of sterling silver candelabra. Among those present were a number of vocational educators from near-by states. A reception followed the program. Accompanying the guest of honor were Mrs. Sylvester and Miss Charlotte Sylvester, his daughter, who shared in the congratulations extended by more than 600 persons present.

The banquet program was a beautiful expression of the friendship and loyalty of his many co-workers and friends. The affair was quite informal. Interspersed with the testimonial speeches and even the dinner itself many songs were sung appropriately worded for the occasion and set to the tune of popular melodies. The high light of the evening was a surprise announcement that it was Mr. Sylvester's birthday as well as a celebration in honor of his 25th anniversary as director of vocational education.

Seated at the two head tables were outstanding leaders in education, business, and civic organizations, including the board of school commissioners and the board of superintendents of Baltimore City. The toastmaster's job was admirably filled by Dr. Ben Robinson, dean of the College of Dentistry of the University of Maryland and chairman of the vocational committee of the board of school commissioners.

The chairman of the program was Miss Edna

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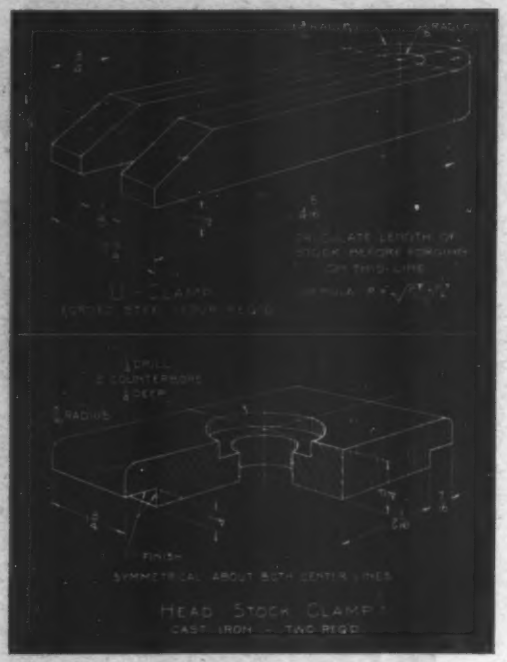

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Engle, principal of the Clara Barton Vocational High School, Baltimore, to whom credit is due in no small measure for the success of the program.

The cochairmen were James O. Proctor, supervisor of Vocational Education for Adults, and Howard E. Ziefle, supervisor of Vocational-Industrial Education. — *Howard E. Ziefle.*

DR. VERNE C. FRYKLUND PROMOTED

Dr. Fryklund, president of The Stout Institute, Menomonie, Wis., was promoted to the rank of colonel in the Officers' Reserve Corps, Army of the United States, effective as of February 18, 1947.

FRANK McCREA RETIRES

Frank H. McCrea, after 27 years of directing vocational and adult education in the Muskegon, Mich., public schools, is retiring from teaching after 35 years in public education.

A native of Newaygo county, Mr. McCrea was graduated by Muskegon High School and the Hackley Manual Training School, and then took two years' work at the Hackley Normal School, qualifying him to teach. Later Mr. McCrea received his A.B. and M.A. degrees from Colorado State College, Fort Collins, Colo.

His first teaching was at Edgerton, Wis., and from there he went to State Teachers College at Weatherford, Okla., for five years as director of art and industrial arts, and became interested in vocational education. After two years as director of industrial education at McKeesport, Pa., Mr. McCrea returned to Muskegon in 1920 as director of continuation and evening schools. His office was at the Hackley Manual Training School for the first year, until the newly acquired Wilson school was opened in 1921, and he was then made principal of it in addition to his previous duties.

Three years ago Mr. McCrea was made director of adult education and related activities and has been located in the Hackley School since.

His many school friends will sorely miss him.

FRED W. GOUDY DIES

Dr. Frederic W. Goudy, famous type designer, died at his home, Deepdene, Marlboro, N. Y., on Sunday, May 11, 1947, at the age of 82.

He was a charter member of the National Graphic Arts Education Association, and did a great deal in furthering the education of our future printers.

♦ A. D. Althouse, supervisor of vocational education, Detroit, Mich., taught a course in tests and measurements at Washington State College at Pullman, Wash., this summer.

♦ M. D. Mobley, who has been at Berlin, Germany, with the Military Government, studying the vocational education program, has returned to again assume his duties as state director of vocational education for Georgia.

♦ Harold H. Kirk, formerly of the Langley Junior High School, Washington, D. C., has been transferred to the Anacosta High School of that city. His new home address is Hewitt Ave., Route 4, Hermitage Village, Rockville, Md.

♦ Dr. Martin Kilpatrick has been named chairman of the department of chemistry at Illinois Institute of Technology, Chicago, Ill. The appointment is effective September 1.

During World War II, Dr. Kilpatrick served as assistant to Dr. Harold C. Urey, director of research, on the atom bomb project at Columbia University.

He was also consultant and co-ordinator for the U. S. Navy bureau of ordnance, for which he received a special award for meritorious services in connection with his investigation of the application of hydrogen peroxide to torpedo propulsion.

♦ Glenn D. Warrick has joined the staff of Western Washington College of Education, Bellingham, Wash.

♦ D. P. Barnard will teach the course in offset lithography which has just been introduced at The Stout Institute, Menomonie, Wis.

♦ Percy L. Schneider was appointed assistant director of community education in charge of adult education of the city of New York early this year.

From 1922 to 1940 he was a teacher of industrial arts in the New York City school system, and for many years during that period he was an active member of the School Crafts Club and one of its past presidents. In 1940 he was designated as assistant director of evening schools, and since that time he has been devoting full time to adult education.

♦ John W. Burley, associate professor of shop practice at Pratt Institute, Brooklyn, N. Y., has retired. He was a member of the Pratt faculty from September, 1907, to June, 1947.

♦ Samuel Nicholas, formerly supervisor of instructional materials of the Armed Air Forces Technical Training Command, has joined the staff of the industrial-arts department of the Elgin High School, Elgin, Ill.

♦ Hans Erichson, retired head of the drafting department of Boys' Technical High School, Milwaukee, Wis., died at his home in Milwaukee on June 17, 1947. He was born in Norway and came to America as a child. He was instructor at the Boys' Technical High School for 27 years, and retired 10 years ago. He died at the age of 79 years.

♦ Fred V. Hiemer, teacher of mechanical drawing at Boys' Technical High School, Milwaukee, Wis., for 22 years, died Tuesday night, July 29, 1947, at the age of 46.

He taught his regular summer school algebra classes at North Division High School on Tuesday morning. He became ill shortly after he came home at noon and was taken to the hospital later.

Hiemer taught for one year at Beaver Dam, Wis., before coming to Boys' Technical High School. He was a graduate of the University of Wisconsin.

He is survived by his wife, a son, and a sister.

♦ Herbert C. Miles has been chosen as instructor of industrial arts at Fulton, Mo.

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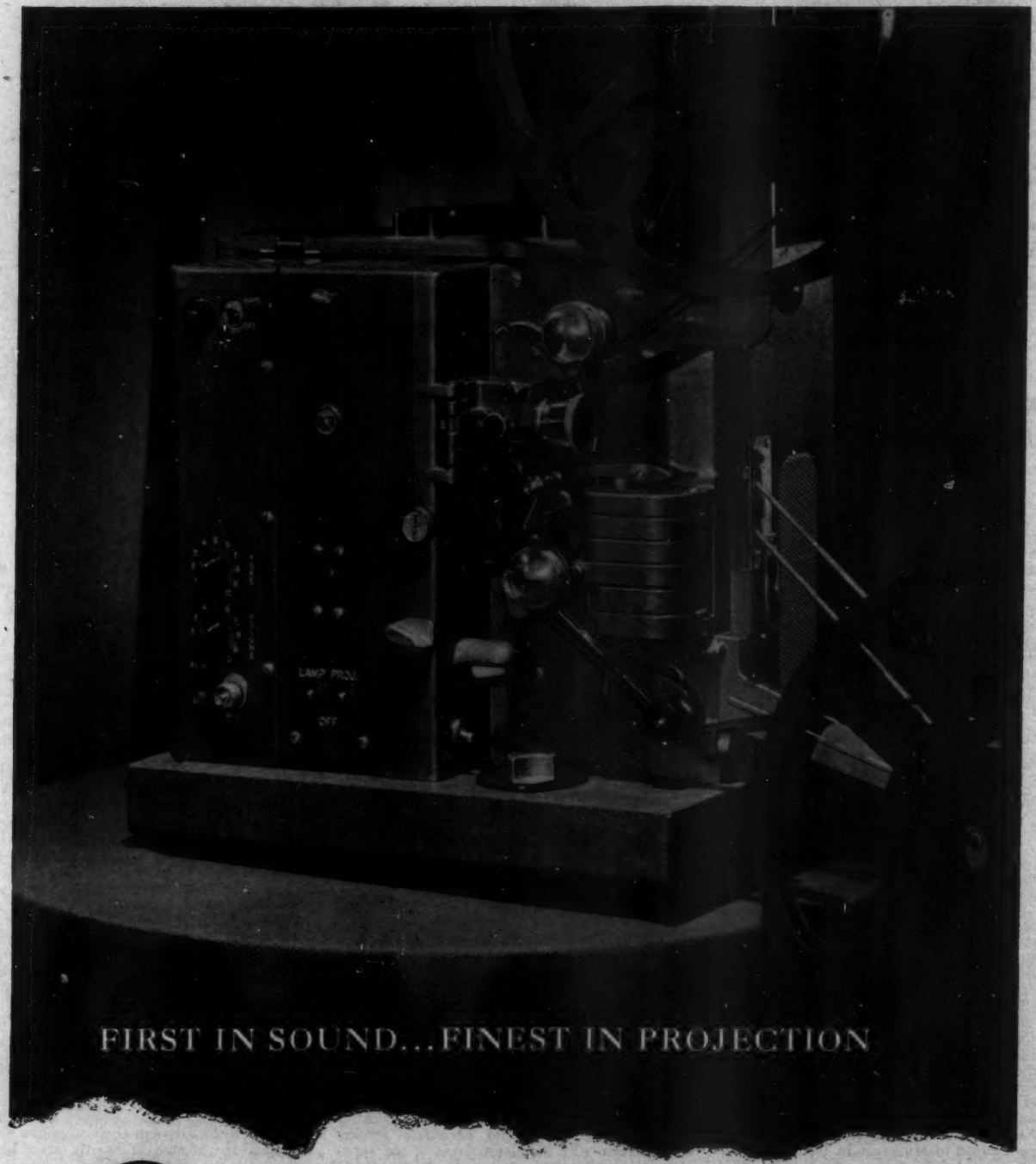

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RCA Victor Distributing Corp.
445 N. Lake Shore Drive

Peoria
Klaus Radio and Electric Co.
707 Main Street

INDIANA
Indianapolis
Modern Audio Visual Div. of Allied, Inc.
3810 E. Sixteenth Street

IOWA
Des Moines
General Pictures Productions
621 Sixth Avenue

Washington
Gordon Music Company
118 E. Washington Street

KENTUCKY
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Office Equipment Company
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Buffalo
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308 Film Exchange Bldg.
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Screen Adette Equipment Corp.
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Pittsburgh
Hamburg Brothers
305 Penn Avenue

RHODE ISLAND
Providence
United Camera Exchange
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SOUTH CAROLINA
Columbia
Palmetto Pictures, Inc.
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SOUTH DAKOTA
Sioux Falls
Midwest-Beach Company
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TENNESSEE
Knoxville
Tennessee Visual Education Service
Journal Bldg., P. O. Box 361

Nashville
Tennessee Visual Education Service
722 Commerce Street

TEXAS
Dallas
Audio Video Institute
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UTAH
Salt Lake City
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Association News

NATIONAL GRAPHIC ARTS EDUCATION ASSOCIATION CONVENTION

The 22nd Annual Conference of the National Graphic Arts Education Association was held at the Morrison Hotel, Chicago, June 16, 17, and 18, 1947. The registration was 332, and 600 attended the annual conference dinner.

There were thirty speakers on the program representative of the entire printing industry. Greetings were extended at the opening session by George F. Cassell, acting superintendent of Chicago Public Schools; Philip L. McNamee, assistant superintendent of the Chicago Public Schools — a former pioneer printing teacher, and co-chairman of the conference committee; Ernest J. Simon, Director, Board of Vocational Education, State of Illinois, Springfield; and Otto H. Ball, president of the Graphic Arts Association of Illinois, vice-president and general manager of The Workman Manufacturing Company, Chicago.

Speakers From Industry

The keynote address on "The Importance of Printing" was delivered by James J. Rudisill, president and treasurer, Rudisill and Company, Lancaster, Pa., and chairman of the P.I.A. Committee on Education. The fundamental processes of printing were discussed and demonstrated graphically by (1) Howard K. Knowlton, Knowlton-Washburn Company, Chicago, who spoke on Letterpress Printing; (2) George Preucil, vice-president, Chicago Rotoprint Company, Chicago, on Gravure; and (3) Philip W. Tubesing, assistant technical director, Chicago Lithographic Institute, Lithography — Offset Lithography. The Chicago Club of Printing House Craftsmen arranged the displays of each process. Another prominent industry speaker who took part in the Panel-Discussion on Veterans Training was Andrew J. Farr, Graphic Arts Association of Illinois.

Industry leaders also gave their viewpoints on the preparation and training required for positions in the Graphic Arts Industries. Those who took part in this interesting session of the Conference were Harry S. Vested, The Mart Press, Chicago; E. G. Hubbell, Neely Printing Company, Chicago; Nelson Allen, W. B. Conkey Company, Hammond, Ind.; C. A. Nordberg, vice-president and treasurer, Chicago Offset Printing Company, and President of Chicago Lithographers Association; John Redpath, Chicago Carton Company; and Lloyd Hollister, president, Lloyd Hollister, Inc. Loren H. Carter, supervisor of training, R. R. Donnelley and Sons Company, Chicago, chairman of the session, gave an excellent summation of the discussions.

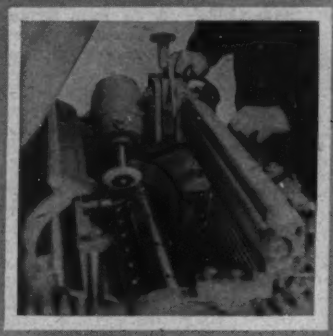
Speakers From the Educational Field

Hartley E. Jackson, San Jose State College, San Jose, Calif., gave the keynote address from the educational angle on the topic: "The Importance of the Printing Teacher." In addition to those already mentioned, the following represented the various phases of education in the program: Byron G. Culver, supervisor, Department of Publishing and Printing, Rochester Institute of Technology, president of the National Graphic Arts Education Association; C. Harold Lauck, Washington and Lee University, Lexington, Va.; E. M. Claude, supervisor of trade and industrial education, State of Illinois, Springfield; Captain C. C. Caveny, dean, University of Illinois Branch, Navy Pier, Chicago; James E. Crowe, assistant director, Veterans Education and Training Program, Chicago Public Schools; Leo Walsh, supervisor, trade and industrial training; John A. Backus, manager, Department of Education, American Type Founders Company, Elizabeth, N. J.; Dr. Edward C. Estabrooke, Educational Director, American Technical Society; Milo T. Oakland, Northern Illinois State Teachers College, DeKalb, Ill.; Milford M. Hamlin, A.T.F., Department of Education, Chicago; and Fred J. Hartman, educational director, National Graphic Arts Education Association, Washington, D. C.

Annual Conference Dinner

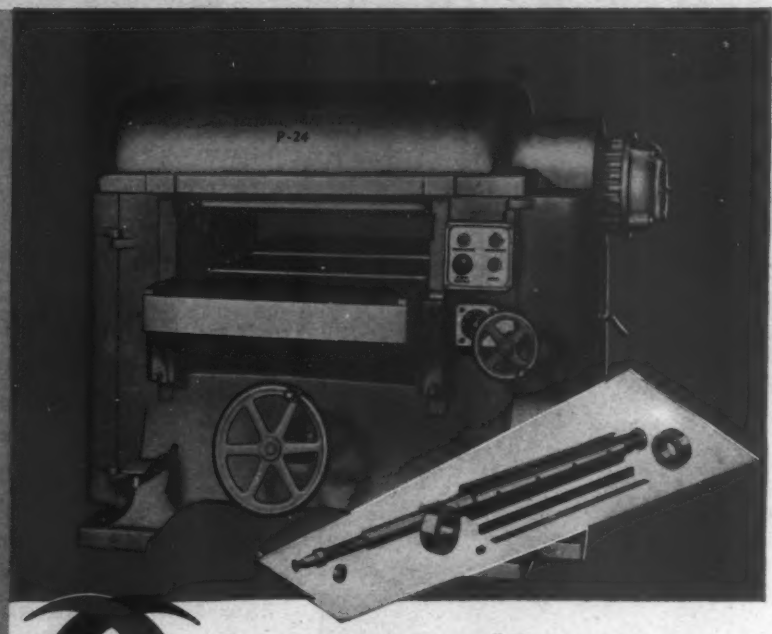
The program at the annual dinner was in charge of John G. Henderson, cochairman with Mr. McNamee of the Local Arrangements Committee. He introduced Byron G. Culver, N.G.A.E.A. President, as the presiding officer. The invocation took the form of a solo, Malotte's "The Lord's Prayer," by Milford M. Hamlin, accompanied by Mrs. Herbert Warfel of Joliet, Ill. The toastmaster, Anthony Czarnecki, Special Writer for the *Chicago Daily News*, added no little to the pleasure of the evening, particularly in the gracious manner he presented the twenty-some people, speakers and guests of honor at the head table on the stage. George Welp, International Printing Ink, New York City, gave an account of the annual essay contests sponsored jointly by I.P.I. and N.G.A.E.A., which are participated in each year by thousands of junior and senior high school students. He awarded the first prize of $500 to David Dry, a printing student of the Timken Vocational High School, Canton, Ohio, the winner of the 1946–47 contest, writing on the subject, "Printing's Place in the Postwar World." Then followed the address of the evening by Dr. Vernon L. Nickell, Superintendent of Public Instruction, State of Illinois. The entertainment which closed the program of the evening was on the same high level of the other events. It was made up of five of the best theatrical productions in current showing in Chicago. An excellent orchestra furnished music throughout the evening.

(Continued on page 28A)



Above: Adjustable motor-driven knife grinder sharpens knives rapidly — right in the head.

Below: Jointing attachment quickly replaces grinder, to true-up knives for precision cutting.



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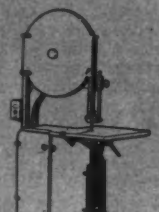

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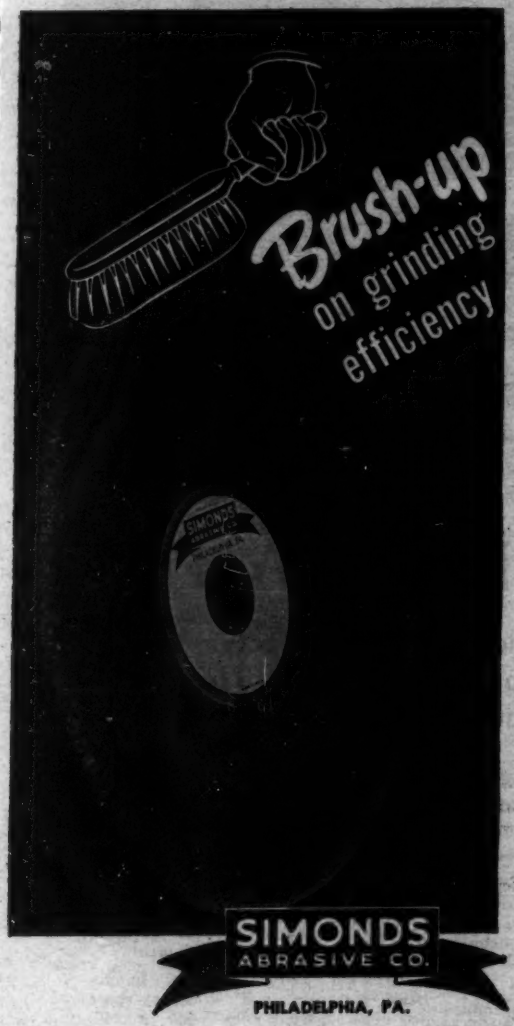

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(Continued from page 26A)

Other Conference Features

Of special interest was an attractive display of school printing, the work of the printing schools of Chicago. There was also a striking exhibit of lithographic printing, the product of the Chicago Lithographic Institute.

At the annual business meeting, Byron G. Culver, Rochester Institute of Technology, Rochester, N. Y., was re-elected as president. The other officers are John G. Henderson, Washburne Trade School, Chicago, vice-president; Harry [illegible]kson, San Jose State College, San Jose, Calif., secretary; Vincent C. Coyne, Middlesex County Vocational School, New Brunswick, N. J., treasurer (re-elected for the seventh consecutive year); and Fred J. Hartman, Washington, D. C., educational director.

TEXAS VOCATIONAL ASSOCIATION CONVENTION

The sixth annual convention of the Texas Vocational Teachers Association was held at Fort Worth on April 3 to 5, 1947. The headquarters for the convention were at the Hotel Texas. The theme was "Vocational Education for a Changing World." There were approximately 900 members in attendance in addition to many visitors. One of the features was the usually fine display by commercial exhibitors. Fifty-four firms participated.

Speakers for general sessions were: J. P. Moore, superintendent of schools, Fort Worth, tex.; D. W. Williams, vice-president for agriculture, A. & M. College of Texas, College Station, tex.; W. W. Fin'ey, vice-president and general manager, Guiberson Corporation, Dallas, Tex.; and W. E. Lowry, executive director, State Board for Vocational Education, Austin, Tex.

At the banquet, Dr. B. E. Jackson, Texas State College for Women, Denton, presented a most unusual and inspiring address.

Attendance prizes were distributed by Harry Sears, deck officer of the "Ship."

C. H. Groneman is the retiring president of the association and he will be succeeded by Wade Banowsky, representative from the distributive education group. Mr. Groneman will become vice-president-at-large effective September 1, 1947. The other vice-presidents elected at this convention were: Miss Harriet Griffin representing guidance; Clarence Rabb representing vocational agriculture; and Vannoy Stewart representing veterans' education. The latter group was admitted as a group to the Texas Vocational Association at this time. It is expected that the membership of the Texas Vocational Association will increase to approximately 2500 for next year with the admission of the veterans' education teachers.

The sectional programs in agriculture, business and distributive education, guidance and rehabi'itation, and homemaking, were all well attended.

♦ The West Virginia Vocational Association held its annual meeting at Jackson's Mill, on March 28 and 29 with approximately two hundred in attendance. The theme of the meeting was "The Further Development of Vocational Education in West Virginia."

Dr. L. H. Dennis, executive secretary of the American Vocational Association, gave the principal address on Friday night. Dr. William A. Shimer, president of Marietta College, spoke on Saturday afternoon, and Dr. Stanley J. Pawelek of Baltimore, Md., was the dinner speaker on Saturday night. C. W. Hill, president of the West Virginia Vocational Association for the past year, presided at the meetings.

A symposium, with Mrs. Madge Boggess from the home-economics section as moderator, was held on Saturday, the 29th. Group meetings were held with each of the five group presidents in charge of his own program.

The State Industrial Arts Association became affiliated with A.V.A. for the first time and had a very fine attendance.

Since the program was so very successful and all in attendance liked the location so well, it was agreed that annual meetings will be regularly scheduled at the Mill each spring.

At the business session, various committees were appointed for the coming year. Cecil Simms of Logan was elected president, and Henry Knight of Charleston was re-elected secretary-treasurer for the coming year.

♦ On March 15, 1947, the Cleveland Industrial Arts Club met for a recognition meeting and a dinner. At this meeting, the club honored 18 retired members with a life membership and 65 of its older members with 25-year certificates. H. F. Mergler, president, presided.

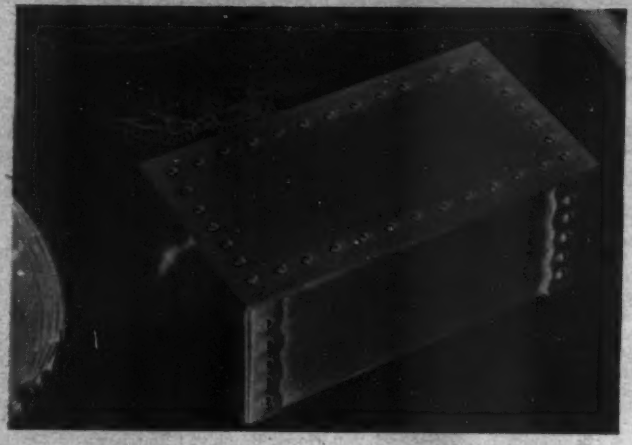
Those who received life certificates were: W. E. Roberts, E. E. Ilgengritz, H. R. Reidenbach, C. H. Clingman, J. D. Chapiop, J. W. Vickerman, L. S. Beman, H. N. Manzler, H. Akerhurst, W. E. Lambirth, W. F. Peach, J. H. Klee, M. H. Patch, C. H. Bonifire, M. H. Yoder, P. J. Minghini, B. F. Marchand, and F. Scheutte. The 65 who received 25-year certificates had an aggregate of 1713 years in the Cleveland system.

Retired at this meeting were the following officers: H. F. Mergler, president; J. C. Neff, treasurer; and E. M. Page, secretary. Newly elected officers for the ensuing year are: James Nemastil, president; William R. Mason, vice-president; Robert Lias, secretary; and Earl E. Smith, treasurer.

♦ The Annual Industrial Arts Conference was held at California State Teachers College, California, Pa., on Friday, April 26, 1947. All shops were open for inspections and many interesting student projects were on display. A number of commercial exhibits were also in evidence, in-

(Continued on page 30A)

New, Handy Way to Buy Aluminum for Projects



Above this aluminum jewelry box is shown the Packaged Bill of Material for making it; 3 pieces of flat sheet and 3 bags of rivets in the sizes required. This is but one of the projects for which materials are packaged. Below is the book describing them in full, and giving working drawings, "Working with Aluminum" by Douglas B. Hobbs; The Bruce Publishing Company, Milwaukee, Wisc. $2.50.

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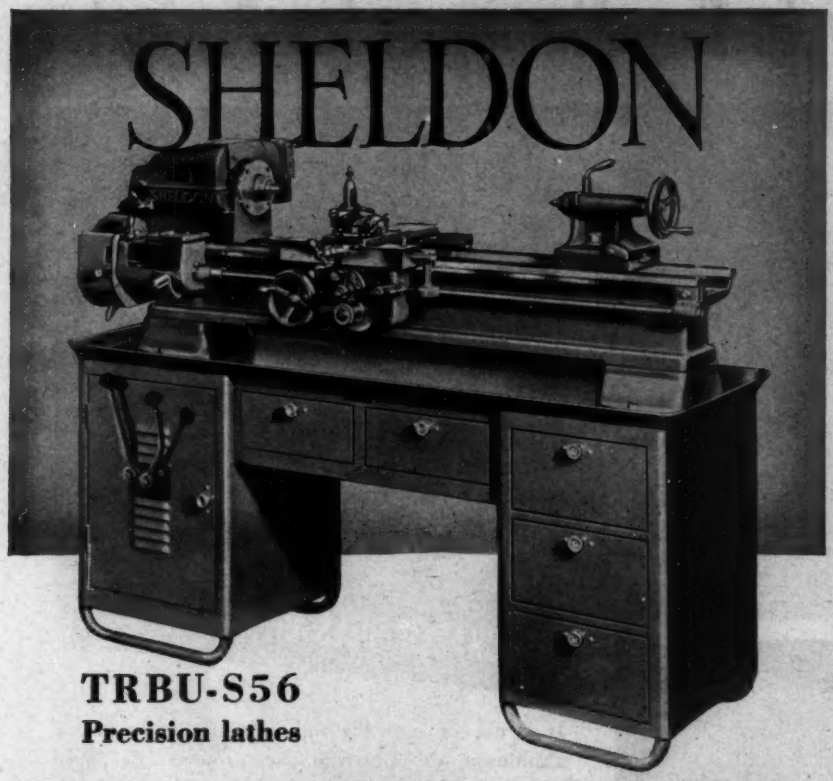

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(Continued from page 28A)

cluding a demonstration of internal carving of plastics by Mr. Barry of the Rohm & Haas Company, which was later brought to Pittsburgh for the entertainment of the members at the last meeting.

The general meeting at 10:00 a.m. was addressed by Dr. Burl N. Osburn, director of industrial-arts education at State Teachers College, Millersville. Dr. Osburn's subject was "The Importance of Industrial Arts in General Education." A second address was delivered by the superintendent of the Johnstown Schools, relating to industrial-arts education from the superintendent's viewpoint.

The luncheon meeting was addressed by Fred P. Hare, Jr., State Senator from the 35th Legislative District of Pennsylvania, who is also Assistant Executive Secretary of the Pennsylvania State Education Association.

♦ Hundreds of high school and grade school art teachers from the midwestern states gathered at Hotel Cleveland, Cleveland, Ohio, on April 30 to May 3, 1947, to attend the 1947 convention of the Western Arts Association.

Using the theme "The Expanding Arts — Is Education Keeping Pace," the convention opened officially with a greeting from Olga M. Schubkegel, director of art, Hammond, Ind. Her message was followed by a talk on the expanding arts by Serge Chermayeff, director of the Institute of Design of Chicago.

Hoyt Sherman, professor at the School of Fine and Applied Arts at Ohio State University, delivered a talk on visual perception; Edward W. Rannells, head of the art department, University of Kentucky, talked on art and emotion in adolescence; Hilde Reiss, curator of Everyday Art Gallery at the Walker Art Center in Minneapolis, addressed the assembly on production and consumption; Dr. S. I. Hayakawa, of the Illinois Institute of Technology of Chicago, used the revision of vision for a subject; Lester Beall, of New York City, talked on advertising art. These talks were kept within the theme "The Expanding Arts."

Trips were taken to exhibits of art at the Thomas Jefferson School, the Cleveland Museum of Art, and special galleries in connection with the convention.

Ceramics, stone cutting, silk screen, lithography, etchings and woodcuts, enamel, and food aesthetics were all demonstrated by experts in their field. Miss Margaret O'Brien, of Chicago, demonstrated the popular finger painting techniques for The Milton Bradley Co., and many other manufacturers held special demonstrations.

The serious business relaxed toward the end of the four-day meeting when the 25th anniversary of the Ship was celebrated with a dance in the main ballroom. Robert C. Stucker was in charge of the quarter-century celebration.

Officers and chairmen who were responsible for the success of the convention were: Olga M. Schubkegel, president; Rosemary Beymer, director of art, Kansas City, vice-president; Harold W. Hunsicker, art department of Cleveland, secretary-treasurer; Dorothy A. Jones, art supervisor, Elyria, auditor; Bernice V. Setzer, director of art, Des Moines, Iowa, chairman of the council; Helen J. Copley, art supervisor, Detroit, chairman of the program committee; Ada Bel Beckwith, chairman of exhibits; Alfred Howell, director of art, Cleveland, chairman of local committees; and Ruth E. Whorl, director of art, Akron, chairman of the program committee for the convention.

♦ The Associated Guilds Teachers of Industrial Arts of the City of New York, which comprise the shopwork teachers of the five boroughs of the city, turned their June meetings into social affairs which were much enjoyed by members and their wives.

Many important matters pertaining to industrial-arts education were discussed and acted upon during the year by the executive council which is headed by President John Hurley, assistant supervisor of industrial arts, New York City.

The following is a list of the June affairs: Queens Guild dinner meeting and dance held at the Knickerbocker Yacht Club, Port Washington, Long Island; Brooklyn Guild, Annual Mug night dinner and presentation held at the Park Vanderbilt Hotel, Brooklyn; Staten Island Guild, model boat races and dinner dance held at Cove Lake Inn, Staten Island; Bronx Guild dinner dance held at Mayer's Restaurant, Bronx; and Manhattan Guild meeting at the Hotel Shermon, New York. — *Walter Lockwood,* secretary.

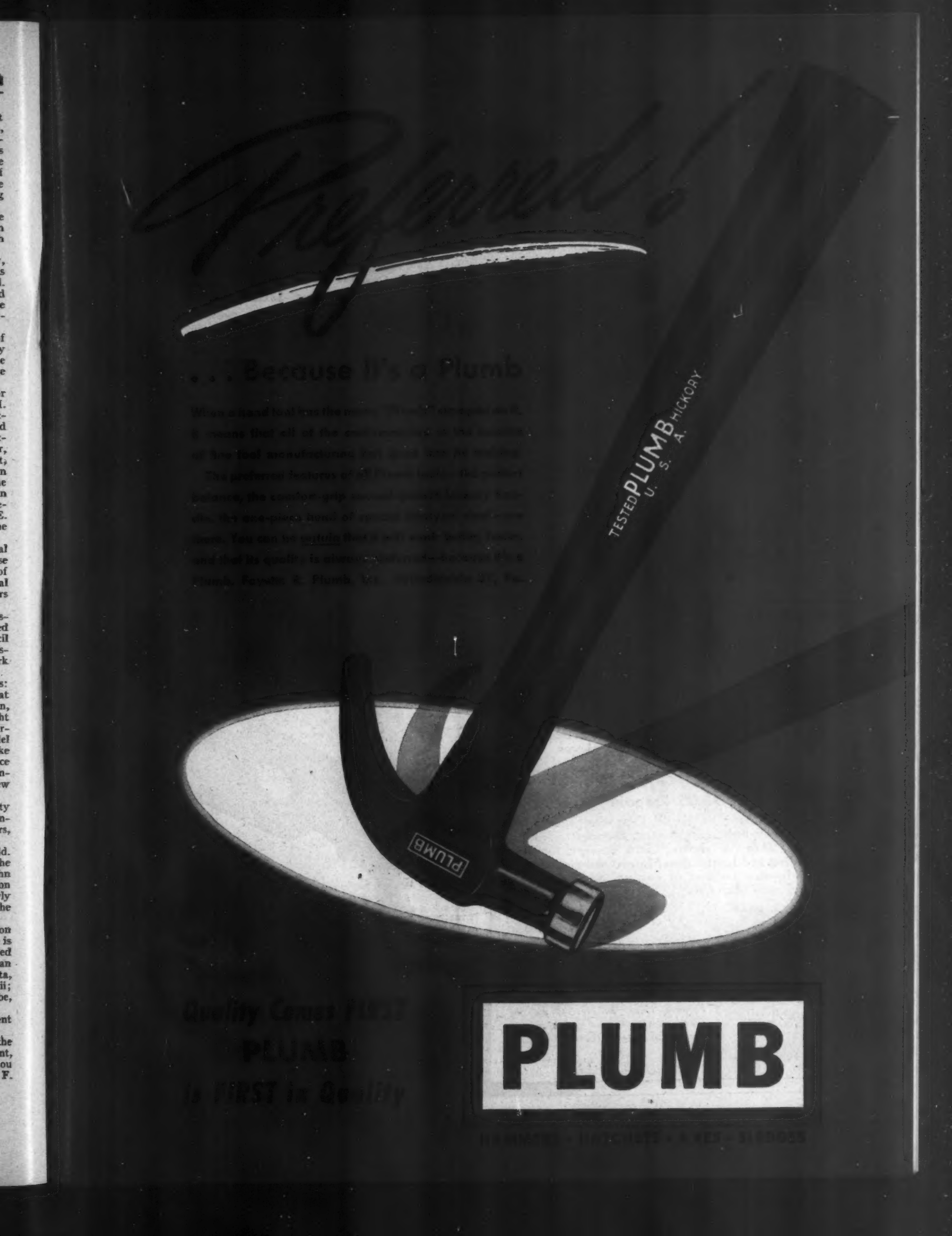
♦ Epsilon Pi Tau, national honorary fraternity in industrial arts and vocational education, initiated into the Stout chapter 22 new members, Saturday, May 17, 1947.

Following the initiation, a luncheon was held. President Verne C. Fryklund spoke to the chapter on behalf of The Stout Institute. John Kubiak, supervisor of occupational information and guidance, Madison, Wis., spoke to the newly elected members. Murry Cliff represented the newly elected members on the campus.

It was pointed out that although the Epsilon Pi Tau is known as a national fraternity it is becoming almost international. Four newly elected members at Stout are from territories other than the United States: Murry Cliff, Calgary, Alberta, Canada; Tashio Hagiwari, Honokoa, Hawaii; Minore Abe, Honolula, Hawaii; Yaso Abe, Honolula, Hawaii.

The Theta chapter is the largest resident chapter of the Epsilon Pi Tau fraternity.

♦ Officers for the current year elected by the Alabama Vocational Association are: president, H. W. Green, Auburn; vice-president, Annie Lou Wigley, Huntsville; secretary-treasurer, O. F. Wise, Birmingham.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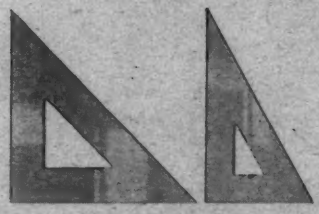

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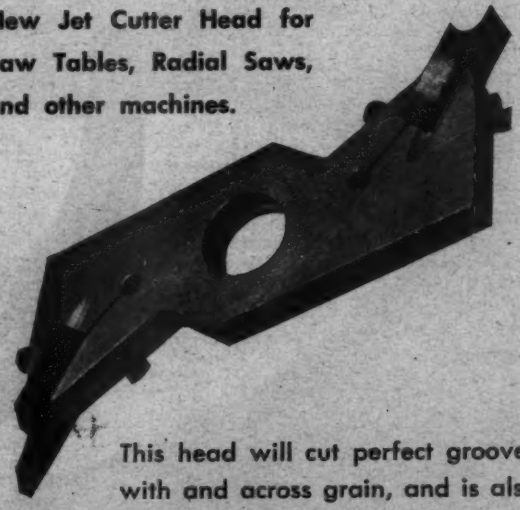
New Jet Cutter Head for Saw Tables, Radial Saws, and other machines.



This head will cut perfect grooves with and across grain, and is also used for small mouldings such as quarter rounds, heads, coves, glue joints, doors, sash, and many other designs. Ask for circular and price list.

Woodworkers Tool Works, Inc.

222-224 S. Jefferson St. Chicago 6, Ill.

Questions and Answers

ADHESIVE FOR CEMENTING FELT, CORK, OR LINOLEUM TO METAL

1117. Q.: I have a project which requires that a piece of felt, cork, or linoleum be glued to a piece of copper or other sheet metal as a pad under a blotter. What kind of glue or cement is best for this purpose? — *F. H. G.*

A.: I have taken a short time to make a few tests before answering your request relative to the use of an adhesive between metal and cork, or a blotting agent. As a result I can now recommend the use of a product made by the Minnesota Mining and Manufacturing Company, Adhesive Division, 411 Piquette Ave., Detroit 2, Mich. Stock No. 3–M Adhesive No. EC 104.

Since this type has an initial set slightly within an hour, no hurry is indicated in its use, or in bringing pressure on the coated surfaces. Under the conditions of use in the school shop this should be a real advantage. The surfaces should be coated with a wide spatula or putty knife; let set at least 10 or 15 minutes and then apply moderate pressure. Give an overnight dry before processing further. A short period of experimental work is indicated at this time before making out a shop routine sheet.

The material is usually sold at all stores handling 3–M coated abrasive papers. — *Ralph G. Waring.*

News Notes

♦ More libraries will loan informational films to community groups as a result of the film advisory service established by the American Library Association, 50 East Huron St., Chicago 11, Ill., under a grant from the Carnegie Corporation of New York. Mrs. Patricia Blair, former director of the Film Bureau, Cleveland Public Library, has been appointed advisor on film service through libraries and started work at Association Headquarters in Chicago, June 16, 1947.

At present, between 75 and 100 libraries in the United States and Canada loan informational films to service clubs, women's groups, discussion forums, and adult classes. Many other libraries have expressed interest in adding films to their collections and in increasing use of films as supplements to book materials.

Mrs. Blair will advise libraries on problems of establishing and developing film services through correspondence and field trips, and will set up a clearinghouse of information on films.

♦ An annual all-day summer exhibit and demonstration in fine and industrial arts, directed by Jerome K. Leavitt, Hampton Institute, Hampton, Va., summer staff member, and supervisor of elementary schools in Los Alamos, N. Mex., was one of the main events of the six-week summer term. Hampton has concurrent six-week and nine-week terms, with the latter scheduled to conclude on August 19.

The exhibit arranged by Mr. Leavitt's classes covered three major phases: industrial-arts work in clay, cement, painting, charcoal rendering, block printing, weaving, plastics, and other forms; demonstrations of the processes involved; and a special section on work by students in the graduate course for teachers of the handicapped. More than half of those enrolled in the last named course were themselves handicapped.

The courses taught by Mr. Leavitt were fine and industrial arts for teachers in elementary schools; industrial arts, materials and methods in the elementary schools; and art for the handicapped.

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♦ After two years of successful experimentation with the offering of technical courses in three of the New York vocational high schools — Gompers, the Machine and Metal Trades and the Brooklyn High School for Homemaking — the board of education has authorized extension of the program to seven additional vocational schools. Graduates of these courses will qualify for the Regents technical diploma.

The new schools taking part in the program will be Alexander Hamilton, Brooklyn High School of Automotive Trades, East New York Vocational, Central High School of Needle Trades, Manhattan High School of Aviation Trades, Metropolitan Vocational, and Woodrow Wilson Vocational School.

♦ "Best Books of 1946 on Vocational Guidance" has just been published by Occupational Index, Inc., New York University, New York 3, N. Y. This six-page leaflet is now available from the publisher for 25 cents cash with order.

This year's listing includes 18 books, each evaluated according to content and use, by Robert Hoppock, Professor of Education, New York University. Also listed, with brief annotations, are the best periodicals.

♦ Students, commercial teachers, stenographers, vocational counselors, and others interested in information about court reporting as an occupation will find valuable data in a six-page leaflet, "Court Reporter," by Charles A. Juckett, just published by Occupational Index, Inc., New York University, New York 3, N. Y. Send 25 cents cash with order.

♦ Two bills of great significance to Western Washington College of Education, Bellingham, Wash., have been passed by the 1947 Legislature.

(Continued on next page)

Ready in August and September

BASIC ESSENTIALS OF STRENGTH OF MATERIALS
By Pisani. Especially written for vocational schools. Elementary mechanics and strength of materials.

MATHEMATICS OF THE SHOPS
By McMackin and Shaver. NEW edition. Special work on the steel square.

F. M. SIMPLIFIED
By Kiver. FM in understandable terms for use of students.

THE POULTRY HANDBOOK
By Seiden. Everything on the care, handling, diseases, and cures of all kinds of poultry.

LEATHERCRAFT
By Thompson. Easy and practical. Tools and processes presented in step-by-step projects.

Important Books now in use —

ELEMENTARY RADIO SERVICING
By Wellman

TELEVISION SIMPLIFIED
By Kiver

MECHANICAL DRAWING
By Nicholson

INDUSTRIAL ELECTRICITY
By Nadon & Gelmine

ELEMENTS OF RADIO
By Hellman

MACHINE SHOP THEORY AND PRACTICE By Wagner & Arthur

D. VAN NOSTRAND COMPANY, INC.
250 FOURTH AVENUE, NEW YORK 3

(Continued from previous page)

The first authorizes the College to grant a master's degree in education, and the second, a bachelor of arts degree. The Governor signed these bills March 12. Thus far the College has conferred only the degree of bachelor of arts in education.

♦ Revised Occupational Abstracts on the jobs of the machinist, bricklayer, pharmacist, and blacksmith have just been released by Occupational Index, Inc., New York University, New York 3, N. Y., at 25 cents each, cash with order.

♦ Cornell University at Ithaca, N. Y., has announced an expanded program in the field of industrial education through the joint efforts of the New York State School of Industrial and Labor Relations and the Graduate School of Education of the University. Industrial education courses offered in the School of Industrial and Labor Relations provide students in this field a wide breadth of training and contact with industry while the Graduate School of Education provides desirable training in the field of education.

The expanded program provides opportunity for specialization on the graduate level in industrial arts, vocational industrial education, and technical education. Several liberal graduate assistantships have been provided, available to out-of-state people as well as New Yorkers.

♦ First term of the first unit of "The University of the Sea" will open at Morehead City, N. C., at the state-owned former Naval Section Base on September 23, 1947.

Dr. E. W. Ruggles, director, College Extension Division, North Carolina State College in Raleigh, under whose auspices the new school, to be known as Morehead City Technical Institute, will operate has arrived here to supervise installation of equipment to be used in the courses of study.

The first unit will offer a one-year course for marine technicians. In addition to the usual curriculum in mathematics, chemistry, and engineering drawing, there will be practical courses in naval architecture and elementary design, internal combustion and Diesel engines, shop practices, electrical engineering, and other courses.

More than 35 students have enrolled for the courses. This number is expected to be increased considerably.

In addition to the State College unit, the property eventually will be headquarters for the division of commercial fisheries of North Carolina, and also for other college units.

♦ An outline of the needs for driver education courses in all high schools and tips to insurance and other local businessmen in promoting such training is being distributed by the National Conservation Bureau, accident prevention division of the Association of Casualty and Surety Companies, through the Association's members. The article, a reprint from the Casualty and Surety Journal, is called "A Civic Responsibility."

♦ The University of Toledo has announced the establishment of a four-year undergraduate program in glass technology leading to the degree of bachelor of engineering. The program will be administered by the University's College of Engineering as one of its options and is scheduled to start in September. Dr. Clarence L. Babcock of the Research Division of Owens-Illinois Glass Co., Toledo 1, Ohio, will be in charge of the initial course in glass technology.

♦ "You Bet Your Life" is the title of the 1947 book of street and highway accident data put out by The Travelers Insurance Co., Hartford, Conn. The booklet contains numerous cartoons emphasizing the vagaries of pedestrians and drivers, and presents the need for caution by many tables which drastically show how badly that caution is needed.

♦ The American boys and girls, under the leadership of their teachers, have already brought Yuletide happiness to more that 500,000 children in liberated war-torn countries, since the end of the war. To each present sent to these children, a friendly note was attached and hundreds of thousands of letters are now streaming back and forth between donors and recipients. Friendship among the young is growing across all frontiers.

Would you like your students to have friends in other countries, chosen by themselves? Will you help them make up their parcels and write a letter? These individual parcels could be packed in cartons and should be sent by freight before October 31, 1947, to *World Festivals for Friendship* warehouse at 35 E. 35th Street, New York 16, N. Y., and we will ship them overseas.

To help defray shipping cost, 10 cents for each pound of the parcel's weight should be sent to our office at 2 W. 45th Street, New York 19, N. Y., Suite 1401.

Your gifts will be distributed at the World Christmas Festivals, celebrated simultaneously in more than 14 countries on December 15, 1947.

♦ Of interest to woodworking teachers are the wall charts published by the American Forest Products Industries, Inc., 1319 Eighteenth St. N.W., Washington, D. C.

"Products of American Forests" presents an analysis of uses of wood on a 30 1/2 by 24 3/4-in. chart.

"Where We Grow Our Trees" is a pictorial map on a 34 by 28-in. chart.

Then there are two "Prevent Forest Fires" charts. One is 14 1/4 by 19 3/4 in., and the other 18 1/4 by 25 3/4 in.

New Publications

More Ben Hunt Whittlings

By W. Ben Hunt. Cloth, 107 pp., 6⅞ by 10½ in., illus., $2.50. The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis.

This is Volume II of Ben Hunt's Whittling Book, and contains 23 additional projects that will please those who are interested in whittling the splendid things that this author offers.

Industrial Apprenticeship

By Paul Bergevin. Cloth, 280 pp., 5⅜ by 8⅛ in., $2.75. McGraw-Hill Book Co., Inc., New York and London.

An excellent book on apprenticeship which will assist the reader to get a good overview of the history of apprenticeship, the principles involved in apprenticeship training, inaugurating and administering such a program, the method of selecting candidates, planning the course of instruction, and of evaluating the training work done.

The appendices contain examples of forms that have been found useful by apprentice trainers.

Air Conditioning and Elements of Refrigeration

By Samuel P. Brown. Cloth, 644 pp., 6¾ by 9¼ in., illus., $6. McGraw-Hill Book Co., Inc., New York and London.

A comprehensive book on an important subject. It is a valuable text for technical and engineering students, but it also will be found useful by those engaged in the designing, manufacturing, erecting, selling, and servicing of air conditioning and refrigerating equipment.

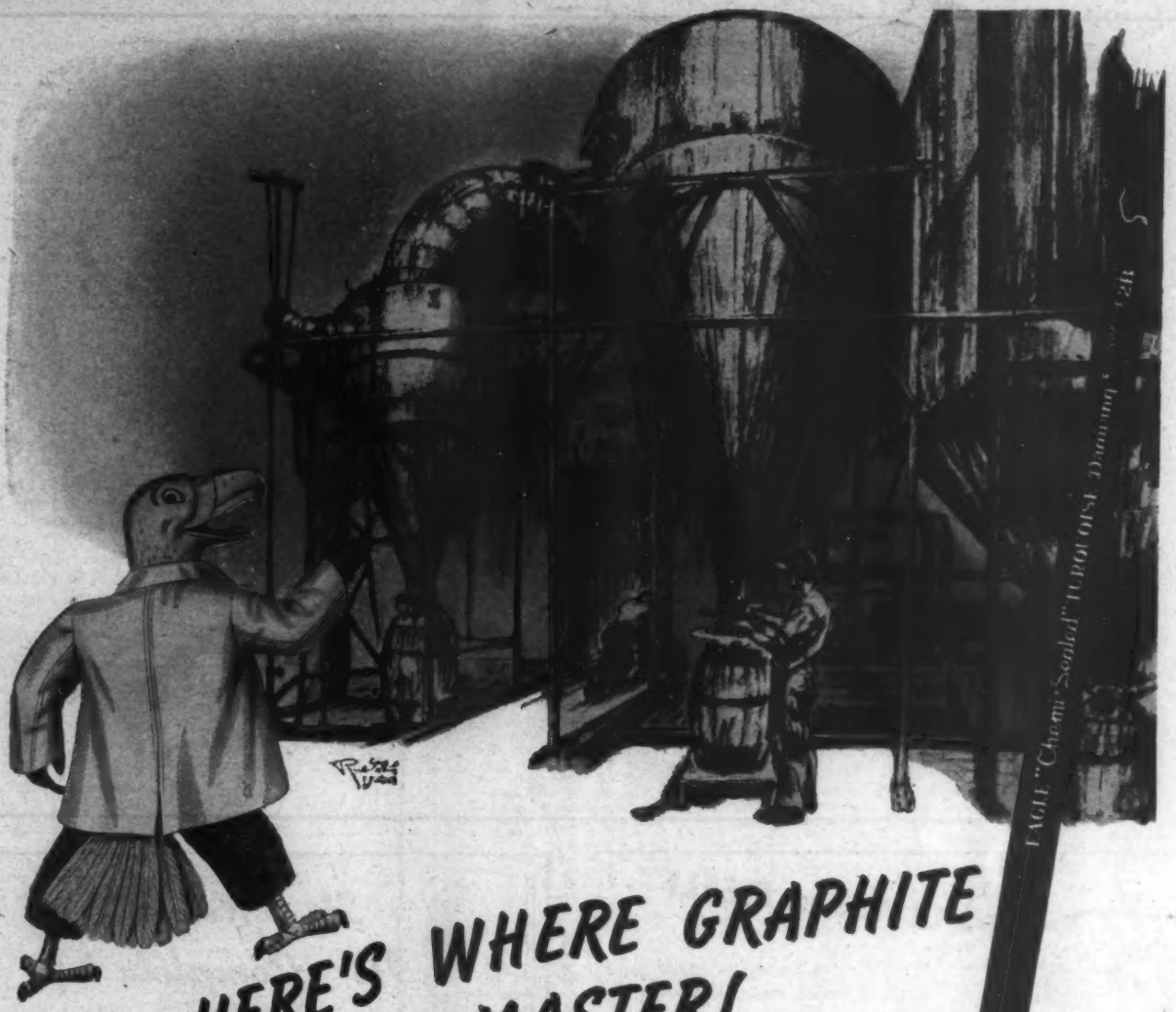
The book contains 27 chapters in which are explained the physical properties of air and gases, the thermodynamics of steam, properties of refrigerants for mechanical systems, mechanical refrigeration and the thermodynamic cycle, the application of refrigeration to air conditioning, calculation of heating load, heating systems, psychrometric study of air conditioning, fluid flow, fans and pumps, ducts and piping, control devices, etc.

Working With Aluminum

By Douglas B. Hobbs. Cloth, 126 pp., 6⅝ by 9¼ in., illus., $2.50. The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis.

This book presents 25 beautiful projects made of aluminum. The student will not only be able to make fine things which will please him and others, but he will also become acquainted with a metal that can be worked with comparative ease

(Continued on page 37A)



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(Continued from page 34A)

while at the same time acquiring skill in the basic metalworking and forming processes. The problems described are: belt buckles, buttons, bracelets, money clips, tie clasps, calendar stand, jewelry box, serving tray letter file, wastebasket, hammered trays, drawn or spun ash tray, hurricane lamp, personalized tray, flowerpot wall brackets, porch lantern, helmet, candlesticks, tie rack, side drapery rods, smoking stand, study lamp, and floor lamp.

Materials of Industry

By Samuel Foster Mersereau, revised by Calvin G. Reen and Kenneth L. Holderman. Cloth, 623 pp., 5⅞ by 8¼ in., illus., $2.80. McGraw-Hill Book Co., Inc., New York and London.

This is the fourth edition of this comprehensive text. The material has been revised and brought up to date. As in previous editions the material covered is arranged under the following headings: forest products, nonmetalic minerals, iron and steel, nonferrous metals, and miscellaneous materials.

Electricity — Principles, Practice, Experiments

By Charles S. Siskind. Cloth, 448 pp., 5½ by 8½ in., illus., $2.60. McGraw-Hill Book Co. Inc., New York City.

A text which presents the principles of d.c. and a.c. electricity in such a manner that the student can recognize similarities and distinguish differences.

A summary and a list of questions at the end of each chapter assist the student in gaining a good grasp of the subject. About forty interesting experiments are included to emphasize the important principles of both electricity and magnetism. There also are descriptions of many useful projects which the students can make, and a large list of visual aids is provided.

Modern Polishes and Specialties

By W. D. John. Cloth, 313 pp., 5¾ by 8¾ in., $7.50. Chemical Publishing Co. Inc., Brooklyn, N. Y.

Written by an expert who has had years of laboratory and industrial experience, this book on polishes with over 700 formulas will be welcomed not only by those in business and industry, but by many instructors who always delight in knowing how to compound the raw materials into the products which they and their students use.

The book contains 22 chapters in which are explained the vegetable, mineral, insect and animal, and synthetic waxes; floor polishes, floor oils, sweeping compounds, and furniture polishes; shoe cleaners, creams, polishes, dressings, and waterproofers; automobile and metal cleaners and polishes; stove polishes; window cleaners, and household powders and cleaners. There also are chapters on miscellaneous formulas and raw materials.

Amateur Handcraft

By F. Clarke Hughes. Cloth, 127 pp., 6¼ by 9¾ in., illus., $2.50. The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis.

A collection of 46 attractive and interesting projects, excellently illustrated, and accompanied with clear and concise explanations. The student or home-shop worker will find in this book many jobs which will introduce him to a number of materials, and many tool operations and processes. All of the projects are well designed.

Short Cuts for Round Layouts

By Joseph J. Kaberlein. Cloth, 269 pp., 6⅜ by 9½ in., illus., $3.75. The Bruce Publishing Co., 540 No. Milwaukee St., Milwaukee 1, Wis.

Another comprehensive text on sheet-metal layout work written by a man who has had much practical experience himself and has trained many apprentices for the trade. This book is an excellent companion piece to the author's previous book, "Air Conditioning Metal Layout."

The Management Leader's Manual

Edited by James O. Rice and M. J. Dooher. Loose-leaf, leatherette binding, 192 pp., 6 by 8½ in., $3. American Management Association, 330 West 42 St., New York 18, N. Y.

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   MASONRY SIMPLIFIED, Vol. II—Practical Construction. *Ready about October 1.*
2. FUNDAMENTALS OF CARPENTRY, Vol I—Tools, Materials, Practice. *Durbahn.* This newcomer to our popular building trades series presents the fundamentals in "teachable" form for the beginner and the apprentice. The organization is flexible, making it easily adaptable to a wide variety of training programs.
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The American Individual Enterprise System

Vol. 1 — Chapters 1 to 11; Vol. 2 — Chapters 12 to 21. A total of 1119 pp., 6½ by 9⅜ in. Cost of the two volumes, boxed, $10. The McGraw-Hill Book Co. Inc., New York, N. Y.

These two volumes have been prepared by the members of the Economic Principles Commission of the National Association of Manufacturers. The books present the collective thought of outstanding economists and businessmen on the economic system that has raised America to be the leading country of the world.

The two volumes contain 21 chapters in which are presented the nature and philosophy of the individual enterprise system, its evolution, its fundamental elements, the types of business organization in this system, employment relations, agriculture, savings and capital, money and credit, profit and loss, price and price determination, transportation, competition and monopoly, marketing, government regulation, public finance, business fluctuations, achievements under the system, government spending to stimulate business, proposals for abandoning the system, program for America's future, and American industry.

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Shop Equipment News

NEW PRODUCTS — PUBLICATIONS

FOUR NEW LE BLOND LATHES

Four new lathes with accessories and attachments will be exhibited by The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio, at the Machine Tool Show, Dodge Chicago Plant, September 17 to 26.

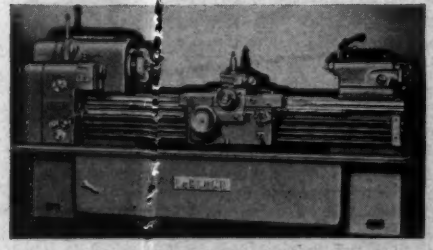

Fig. 1. LeBlond Model RT heavy-duty lathe with single level control headstock, 16 by 54 in.

The 16" Model RT heavy-duty lathe with single lever headstock (Fig. 1) is a combination gear-belt drive lathe with hardened and ground steel gears throughout the headstock. It has a single lever controlling 16 spindle speeds ranging from 20 to 1025 r.p.m. or 30 to 1537 r.p.m. The change box is totally enclosed and automatically lubricated. The lathe also is equipped with a universal power rapid traverse which moves carriage, cross slide, and tailstock; a one-piece apron with positive jaw-feed clutch; a streamlined tailstock with direct-reading spindle-barrel travel dial. Automatic lubrication is provided in the headstock, feed box, and apron; and the dials, gauges, and indicators are accurately graduated.

A 16" Model RT heavy-duty lathe with variable speed headstock offers a virtually unlimited number of spindle speeds ranging from 6 to 1500 r.p.m. It is equipped with a universal quick change box that is totally enclosed and automatically lubricated; a combined feed apron with positive jaw-feed clutch; and is built and equipped with many other features in common with the single-lever control headstock model shown in Figure 1.

Fig. 2. LeBlond heavy-duty engine lathe, 25 by 72 in.

The new 25-in. heavy-duty engine lathe (Fig. 2) is the first machine of that type and size to be built with a totally enclosed and automatically lubricated quick change box. Forty-eight changes of feeds and threads may be obtained without change gears from the direct-reading plate mounted above the tumbler shifter.

This lathe also offers 16 spindle speeds ranging from 6.5 to 400 r.p.m., or 10 to 600 r.p.m.; one-piece apron with positive jaw-feed clutch; and a worm and rack construction tailstock.

The LeBlond Dual Drive lathe (Fig. 3), is

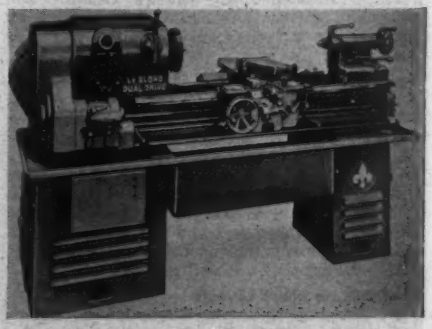

Fig. 3. LeBlond dual drive lathe, 15 by 30 in.

a combination gear-belt drive headstock lathe with a single lever controlling 12 spindle speeds ranging from 28 to 1800 r.p.m. The totally enclosed and automatically lubricated quick change box provides 48 feed and thread changes and there is a one-piece apron with positive jaw-feed clutch, and the multiple disk clutch and brake can be controlled from headstock and

(Continued on page 40A)

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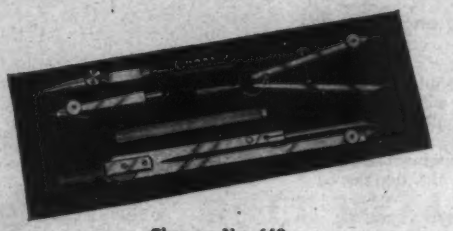

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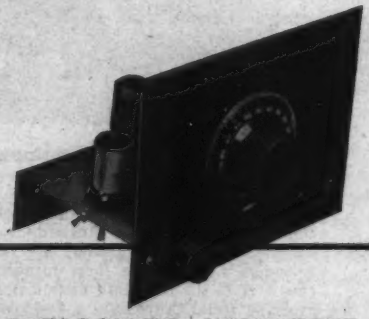

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(Continued from page 38A)

apron. It is equipped with deep-steel chip pan, multiple automatic length stops, and 3-horsepower main drive motor as standard equipment.

Fig. 4. LeBlond heavy-duty engine lathe, 40 by 156 in.

The 40 x 156 in. LeBlond heavy-duty engine lathe shown in Figure 4, is built with totally enclosed, automatically lubricated quick change box which provides 54 changes of feeds and threads without change gears, all obtained from direct reading plate mounted above the tumbler shifter.

It also is equipped with a 27-speed geared headstock, periphery-driven face plate, one-piece apron with positive jaw-feed clutch and automatic lubrication, thrust-lock tailstock with worm and rack construction, power-rapid traverse, and power-angular feed to compound rest.

For brief reference use IAVE—0901.

ADJUSTABLE SAW TRACK

A structural steel welded track, readily adjustable for use with Stanley safety saws W7, W8, and W9 for square, bevel, or bevel miter cuts, has been marketed recently by Stanley Electric Tools, Division of the Stanley Works, New Britain, Conn. With this saw track the user eliminates laying out and marking each piece of lumber and will find it a real cost saver in cutting lumber to exact size desired. The saw track can also be used for cutting slate, marble, etc., when the proper abrasive wheel is used.

The No. 158 saw track is 37 in. long. The over-all width is 7¾ in.; the maximum height under track, 4½ in.; the maximum width of wood possible to cut is 17½ in.; the over-all height is 5¼ in.; and the over-all track length is 34¼ in.

Stanley adjustable saw track

The instructions for using are simple, as can be seen from the following directions.

1. To set up the saw track drill a ⅜-in. hole in bench for locating the pin shown. Insert pin through hole in track into bench hole. This is a pivot point and various desired angles, such as 30 deg., 45 deg., 60 deg., etc., can be layed out, by drilling holes in the bench for locating the pin in the opposite end of the track.
2. Block up under the board to be cut to the desired height. Install a work stop.
3. Set the adjustable saw guide in or out to suit width of the base of the saw being used.
4. Adjust the position of the guard trip to the proper location to trip guard of the saw used.

For brief reference use IAVE—0902.

NEW TUNGSTEN-CARBIDE-TIPPED TURNING CHISEL

A new turning chisel with a tungsten carbide tip which opens new fields in lathe turning, has just been placed on the market. This chisel with its hardened tip presents to the home crafter for the first time the same type of cutting action which has been used in heavy industry throughout the war. For the first time a hand-held turning chisel is used in free-hand cutting or turning of metals such as brass, aluminum, magnesium, copper, nickel, silver, and even cold rolled steel.

Tungsten-carbide tipped turning chisels

The technique used in turning with these new chisels is only slightly different from previous turning methods which users are familiar with. A complete instruction sheet furnished with the chisels gives the little information needed to turn excellent metal projects.

Two of these new chisels comprise a set. Either the large 1/4-in. round and 1/4-in. square, or the small 1/8-in. round and 1/8-in. square chisels comprise a set. These two chisels will accomplish all of the wood turning formerly possible with a set of eight or nine turning chisels. In addition to all of this, the turning of metal free hand is added to the use that you can obtain from a set of these new tools.

All of this turning may be done on the regular woodworking lathe and at a regular, high, woodworking-lathe speed.

This new chisel may be used to turn practically any type of plastic on the market today. Lucite and plexiglas, which are popular at the present time in home workshops, are ordinarily very hard on turning tools. This new chisel will take any amount of turning work on such abrasive materials without the ordinary wear and sharpening required on former turning tools. The lathe speed used in turning certain types of plastic is slightly reduced to prevent burning or fusing of the plastic itself.

Switching from wood or plastics to metal and back to wood or plastics has practically no effect

(Continued on page 43A)

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The book on sheet metal covers all the techniques of burring and filing, bend allowance, shrinkage and stretching, drilling, riveting, and assembly, with special chapters on forming the three principal types of metal used in aircraft — aluminum, magnesium alloys, and corrosion-resistant alloys.

The book on welding gives detailed, step-by-step instruction in all welding equipment and technique, with practical problems in each step from the first elementary operations to those of the advanced, skilled welder. There are separate chapters on welding the different types of metals and alloys, and detailed instructions for the construction of a typical welded rudder, stabilizer, vertical fin, engine mount and section of a welded tube fuselage. *Each book, $4.00*

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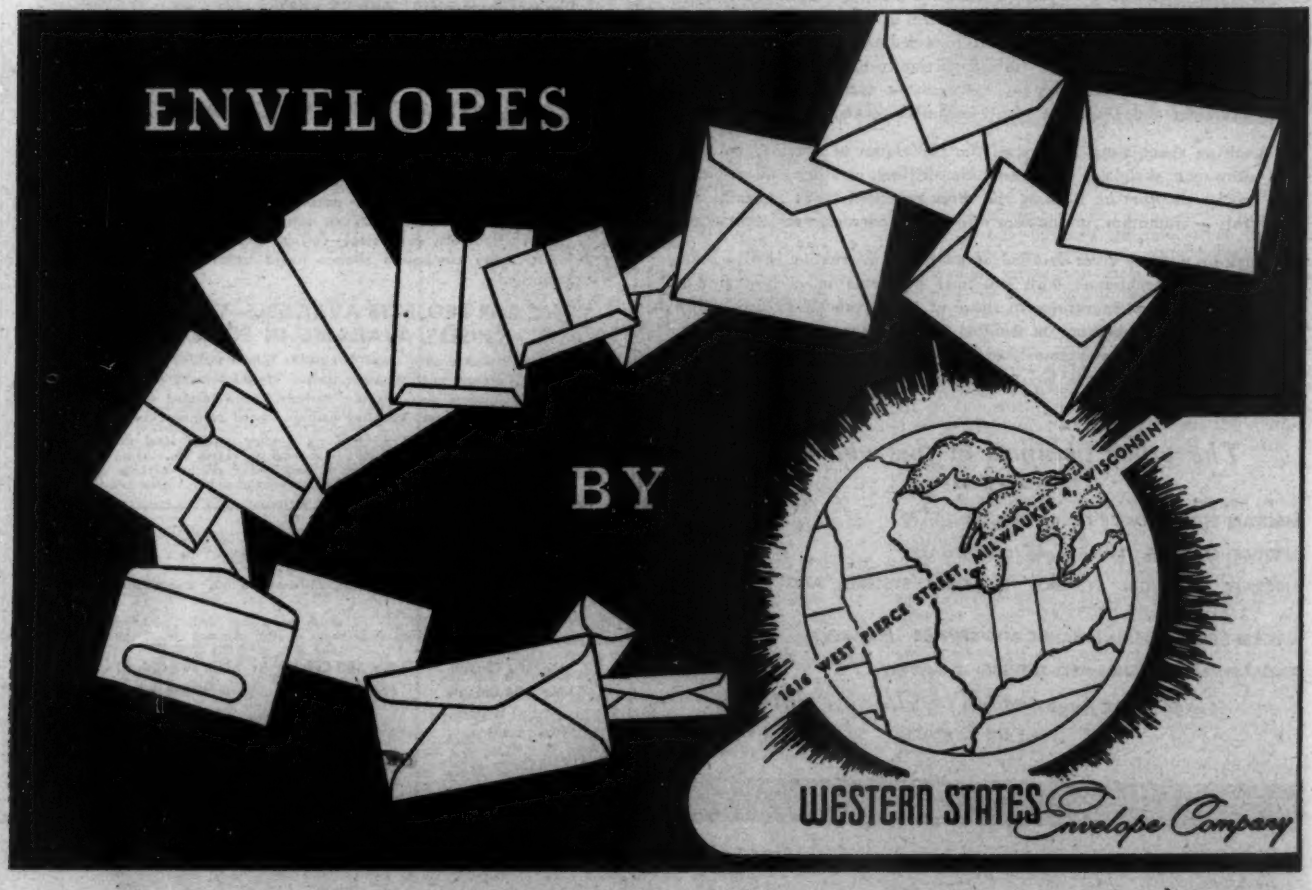

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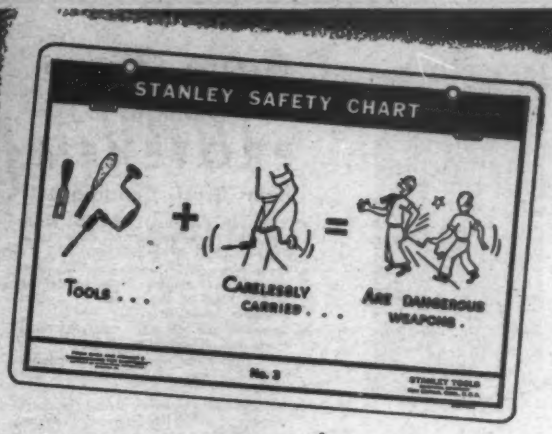

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(Continued from page 40A)

whatever on the cutting edge of the chisel. After a considerable amount of metal turning it is advisable to touch up the tip with a slight amount of honing on a silicon carbide stone.

These chisels are immediately available to you. For further information address Martin Incorporated, 548 W. Rock Place, Milwaukee 12, Wis.

For brief reference use IAVE—0903.

DoALL "HANDRAULIC" SURFACE GRINDER

In this new Model GH-1 "Handraulic" Surface Grinder, The DoALL Company, Des Plaines, Ill., has combined the finger tip control of the conventional hand operated grinder with the smooth automatic power feeds found in hydraulically powered machines.

Instead of a handwheel connected to the table by rack and pinion, there is, in the "Handraulic" a direct coupled hydraulic cylinder to power the table movement. Starting, stopping, and reversing of the table is controlled by a self-centering four-way valve. The valve is operated by a conveniently located 6 in. hand lever with a ball handle. When the lever is pushed in the desired direction the table starts instantly and moves at a uniform speed. To stop the table, the operator merely releases the handle which automatically returns to neutral, thus stopping the table. Through a valve located next to the directional control lever, table speeds variable from 5 to 50 ft. per minute are obtained.

The table is equipped with new type combination trip dogs to regulate length of table travel. These trip dogs can be set to stop the table either automatically by returning the control lever to neutral or instantly at a predetermined point regardless of the position of the lever.

The manually operated 1-in. cross-feed screw is located in the center between the crossways. It operates in a large bronze nut and its thrust is taken by double preloaded Timken taper bearings. The cross-feed handwheel is graduated in

DoAll hydraulic surface grinder

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For brief reference use IAVE—0904.

NEW DI-ACRO ROD PARTERS

The new Di-Acro Rod Parter, a product of the O'Neil-Irwin Manufacturing Co., Lake City, Minn, is offered in two sizes with capacities of 3/8 and 5/8-in. cold-rolled steel bars.

Rods made of plastics, fiber, rubber, wood and bimetals, as well as stainless steel, chrome molybdenum, copper, brass, aluminum, and other materials also may be cut on these machines.

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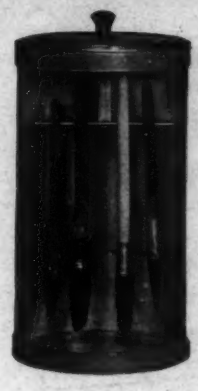
(Continued on page 47A)



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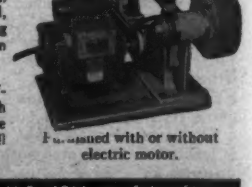

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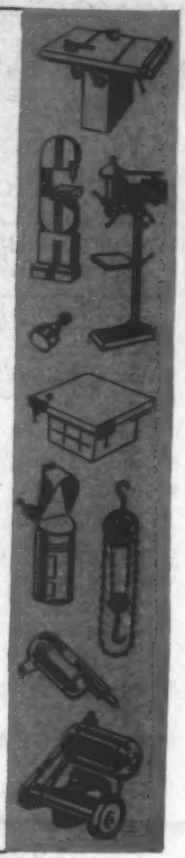

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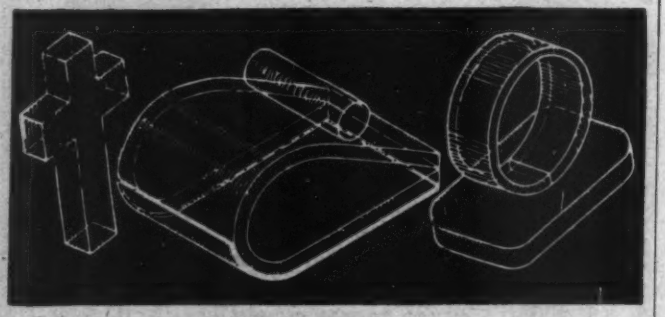

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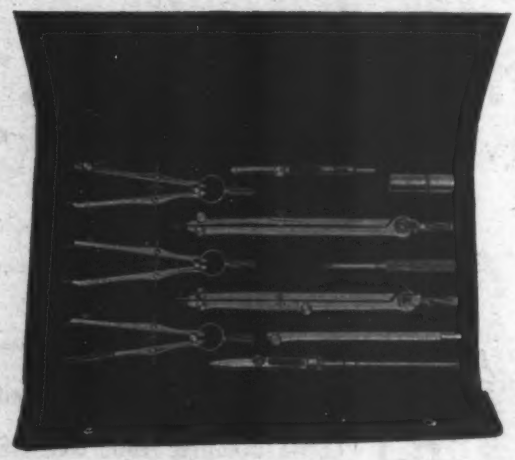

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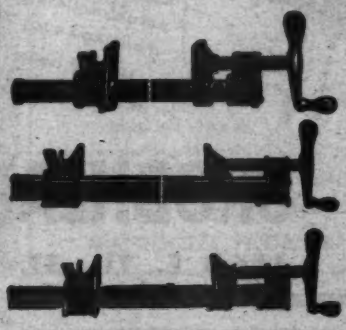

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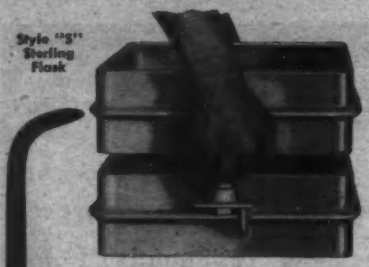

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(Continued from page 43A)

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gauge allows rods to be quickly positioned and parted with infinite precision. Rods can be removed without disturbing the precision adjustment of the gauge.

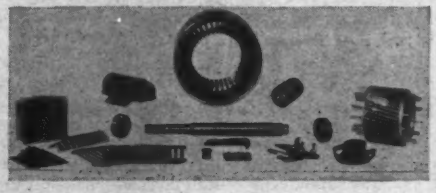
For brief reference use IAVE—0905.

NEW EDUCATIONAL KITS ON MOTORS AVAILABLE

To meet the need for practical construction experience in electrical courses in schools and colleges, the General Electric Co. has made available a number of educational kits on fractional-horsepower motors.

The new kits contain standard punching parts, and part assemblies, as well as a complete set of instructions for machining and assembling. Also included are a set of double-sealed ball bearings and a special name plate for easy identification.

So that the student may receive instruction in machining and building the motors, some parts have not been machined. Parts which re-



Fractional-horsepower motor kit

quire special machines for processing are furnished in finished condition to avoid the possibility of spoilage and to reduce the time necessary for construction of the kit.

Additional information can be supplied by the Educational Section, Special Products Division, General Electric Co., Schenectady, N. Y., or the Fractional Horsepower Motor Division, General Electric Co., Fort Wayne, Ind.

For brief reference use IAVE—0906.

NEW SKILSAW TOOLS

Skilsaw, Inc., 5033 Elston Ave., Chicago 30, Ill., recently announced its entrance into the pnuematic tool field with a new line of 28 models. These include pneumatic hammers, drills, screw drivers, nut runners, and die grinders.

With the acquisition of proper manufacturing facilities in Aurora, Ill., all pnuematic tools will be produced there, leaving the Chicago plant free to continue production of the electric Skil Tool line.

For brief reference use IAVE—0907.

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(Continued on next page)

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(Continued from previous page)

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Detailed information and school prices will be given on request.

For brief reference use IAVE—0906.

BLACKHAWK AIDS TO VOCATIONAL SCHOOLS

A teacher's aid package, bearing the title "Here is How Blackhawk Shop Equipment Serves in the Vocational School," has been assembled by the Blackhawk Mfg. Co., Milwaukee 1, Wis.

This package contains advice on what to include in the vocational school equipment in the way of Porto-Power, hand jacks, service jacks, wrenches, tension indicators, hydraulic presses, hydraulic hand and service jacks, torque indicators, and socket, pox-type and open-end wrenches.

All of these items are presented in a number of well-illustrated booklets which are part of this teacher's aid package.

For brief reference use IAVE—0907.

CATALOG ON SOUTH BEND LATHES

Catalog 13-5 on 13-in. South Bend precision lathes, describing the toolroom precision lathe and the quick change gear precision lathe are now available.

The catalog, beautifully illustrated, gives the specifications of these lathes and describes the special features which they embody.

A copy of this catalog may be obtained by writing to the South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind.

For brief reference use IAVE—0908.

JAM HANDY CATALOG

"Slidefilms and Motion Pictures — To Help Instructors" is the title of a new catalog of selected visual teaching aids produced and distributed by the School Service Department of The Jam Handy Organization. This booklet lists discussional slide-film kits, sound slide films, and educational sound motion pictures for vocational training and classroom use. All subjects have been selected for timeliness and adaptability to current teaching trends and instructors' needs. Free copies of this new catalog may be obtained by writing to The Jam Handy Organization, 2821 East Grand Blvd., Detroit 11, Mich.

For brief reference use IAVE—0909.

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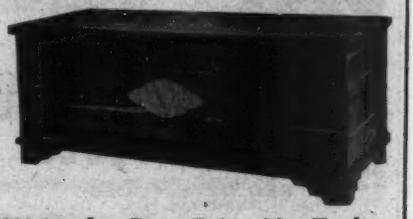

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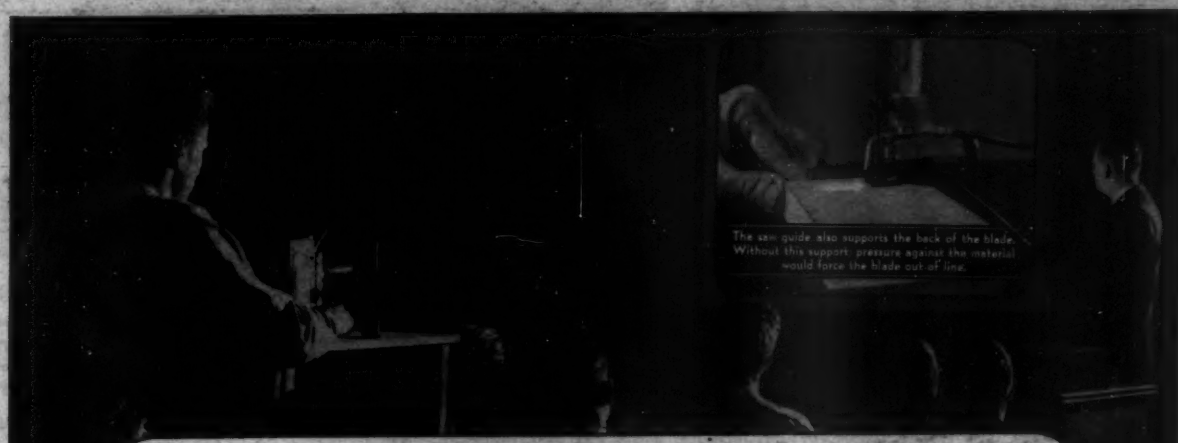
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